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OF
PHOTOGRAPHIC GEMS.

A COLLECTION OF
500 DODGES, RECEIPTS, ENTERTAINING EXPERIMENTS, &c.,
IN CONNECTION WITH THE ART OF PHOTOGRAPHY
AND ITS BRANCHES.

COLLECTED, CLASSIFIED, & ARRANGED, FOR READY REFERENCE,

BY

W. INGLES ROGERS.

LONDON:
PIPER & CARTER, 5, FURNIVAL STREET, HOLBORN.

1890.

MANUFACTURE

CAMERAS. LENSES, &c

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112/6	131/-	161/-	227/-	275/-

"I should strongly recommend Rayment's Camera. It is LIGHT, COMPACT, very RIGID, and extends to about double the usual focus."—*Amateur Photographer*.

PORTABLE (A.R.) CAMERA.

Compact, Rigid, Inexpensive, and of Excellent Finish.

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Cheap, Strong, Serviceable, and Efficient.

Durable, Bellows, hinged Focussing Screen with sliding adjustment, readily and securely held in exact position by means of a pinion passing through the body nearest bottom or base board, and having milled head screws on either side of the Instrument to clamp tight.

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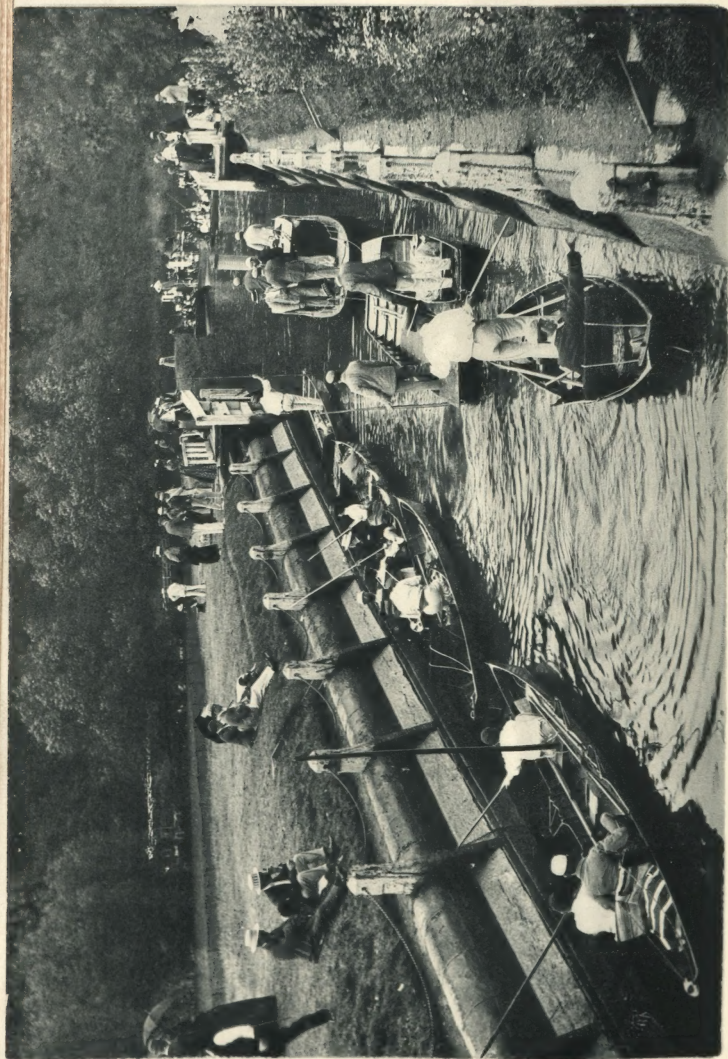
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"IN COOKHAM LOCK."

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PREFACE.

THE encouraging reception of my little pamphlet, "ONE HUNDRED PHOTOGRAPHIC DODGES," in the ranks of the photographic army has led me to compile a work of a similar nature, but on a much larger and more elaborate scale, comprising FIVE TIMES the amount of information at but DOUBLE the cost.

In the following pages will be found a collection of "gems" culled from the photographic literature of the past half-dozen years, thus bringing, as it were, the hitherto wide-spread rays of genius and research into one common focus, from which they may be the more readily projected into the mind and practice of the reader.

Like the former work, the present one is intended to be useful as a ready reference-book for the "old hand" as well as a means of instruction for the young beginner, and to form a handy pocket companion for both.

The frontispiece is an admirable specimen of Messrs. Waterlow & Sons' collotype work, and represents Cookham Lock, with a party of pleasure-seekers returning from Henley Regatta, a little further up the river. The "sharpness" and "pluck" throughout the whole picture testifies to the good quality of the lens and shutter employed in photographing the scene, as well as to the technical beauty of the plate used in its reproduction.

St. Germans, Cornwall, June 4th, 1890.

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PART I.—In The Field.

1.—Registering Screen.

Before commencing to use a new camera, careful tests should be made that the focussing screen is properly in register, that is, that it occupies exactly the same position as the plate will when the dark slide is inserted. The simplest mode of doing this is to focus on screen in usual way, then put a sheet of ground glass in place of a plate in double back, leave out dividing black tin, insert double back in camera, and image can then be seen on ground glass, and, if register is correct, it will be equally sharp as it was on focussing screen.

2.—Simple View-Meter.

A very good view-meter, and one that will prove extremely useful to those in search of landscape pictures, whether to photograph or sketch, can be made out of a piece of cardboard, either kept white, or blackened, as taste may prefer. Cut an oblong square opening in it, leaving a couple of inches margin all round. Let this be held before the eyes when "prospecting," moving it nearer or further off, as the case may be, till a decision is come to as to how much may be included in the intended picture.

3.—Estimating Exposures.

The following simple method of estimating the exposures required by ordinary open landscapes will be found useful as a supplement to Mr. Burton's excellent table :—

			About
10 feet distant from camera	...	...	4 seconds
20 " "	"	...	2 "
40 " "	"	...	1 "
100 " "	"	...	$\frac{1}{2}$ "
100 yards	"	...	$\frac{1}{4}$ "
$\frac{1}{4}$ mile	"	...	$\frac{1}{8}$ "
Beyond $\frac{1}{4}$ mile	"	...	$\frac{1}{10}$ "

These exposures are for the full aperture of a portable symme-

trical lens ($\frac{f}{v}$) in good summer light and with instantaneous plates. The distance reckoned is to the nearest shadows which will occupy any sensible area in the photograph. The relative exposures with other lenses and stops are calculated in the usual way.

4.—To Find the Focal Length of a Lens.

Rack out camera until image on ground glass is same size as object to be photographed; measure distance from object to image, and divide by 4. Resulting figure is focal length.

5.—Backgrounds.

A good plan of painting backgrounds is by using dry colours in the form of pastels, the pastels being home-made of pipeclay or modelling clay. Divide this clay into four parts, and put one of them into a tin dish with a little water, and add lampblack a little at a time, working it with the hands till it is thoroughly mixed with the clay, adding water as you add the black to keep the clay moist. To this first part work in as much black as it will hold, as it is for the darkest parts of your background. When thoroughly mixed, divide this into pieces, and roll them roughly into the shape of pastels, some larger than others, but all considerably larger than the ordinary pastels. The other portions must be mixed in the same manner, with less black each time, so that the fourth portion will be light enough to make the lightest part of the background. A little of the pipeclay or modelling clay can be rolled into a stick without the addition of black. This will do for the highest lights. When dry—and they must be allowed to dry of themselves—they can be used in the same manner as pastels, broad masses of light or shade being rubbed in with the whole length of the stick, bringing the different tints roughly up to each other, and blending and graduating with the hand. Lines and details are put in with the edge of the stick, using the fingers for blending.

6.—Improvising Film-Carriers.

Those who are desirous of trying paper without going to the expense of film-carriers, may easily and at small cost improvise some simple contrivance which will answer the purpose. For small sizes, indeed, scarcely any preparation is needful; if the paper be tolerably flat, as it should be when received from the maker, all that is necessary is to lay it face downwards in the rebate of the slide, and to place a glass plate over it to keep it in position, using of course the ordinary central partition to prevent the light passing from one film to the other. For larger sizes, from $8\frac{1}{2}$ by $6\frac{1}{2}$ and upwards, this method is scarcely to be recommended, but a very slight modification will serve. Prepare a

very thick solution of gelatine in glycerine, and with this go carefully round the margins of a warmed glass plate, giving an edging of about one-eighth of an inch in depth all round. If a little time be spent in doing this carefully and neatly, we shall have a perfect film-carrier, the adhesive edging being sufficient to hold the paper firmly and smoothly, while permitting its easy removal after exposure. One edging will answer for several exposures.

7.—Hint to Sitters.

“The best mode of occupying the sitter’s attention,” says Baden Pritchard, “is that of asking him to repeat to himself some poem or song he knows by heart—a method, I believe, always adopted by one of our most eminent portraitists.”

8.—Plate-Carriers.

First of all, cut a number of strips of wood from a cigar-box, six and a half inches long and one inch broad, and a similar number the same length, but one-eighth of an inch narrower. Four of these when put together form a frame measuring $8\frac{1}{2}$ by $6\frac{1}{2}$ outside, with a central opening $6\frac{1}{2}$ by $4\frac{3}{4}$. Next, from the mill-board forming the tops and bottoms of empty plate boxes, cut out solid frames, measuring about $8\frac{1}{4}$ by $6\frac{1}{4}$ outside measurement (or just small enough to fall into the dark slide without touching the rebate) and with a central opening $6\frac{1}{4}$ by $4\frac{1}{2}$. Each of these cardboard frames being glued to the wooden ones and put under a heavy pressure overnight, make simple but effective plate-carriers.

9.—Out-door Portraiture.

If a three-fold screen be used having one side placed at right-angles to the side forming the background, and the other side at an angle of 45 degrees, and a white cloth placed on the ground, the illumination will be fairly even. The background should be of a rather dark neutral grey, and the sides white, the side at 45 degrees being placed on the shaded side of the face. The camera should be at least twelve feet from the sitter.

10.—Portable Studio.

A very useful tent may be constructed after the following plan:—Four wooden uprights with spikes in the bottom are placed six feet apart, and joined by light iron rods. It is well to have the side irons to project a foot or two over the uprights, so that in cases of emergency the top curtains of white calico which they support may be drawn more to the front. The curtains on the one side must be white calico, and on the other

dark grey or some neutral tint. Do not have black, as they cast unpleasant reflections. The uprights should be fastened to the ground by cords; they can also be made jointed for convenience of packing. Two or three rings should be put in the uprights in order to secure the curtains by tapes to the sides should there be any wind. The white or light side of the tent should be placed toward a north light if possible. A very good background suitable for a tent of this description can be purchased for a few shillings. This, if attached to a roller, can be fixed to the back of tent, and helps to secure greater rigidity, as well as being the best method of keeping it free from creases. When not in use the uprights may be stowed away in a small space, and the curtains folded up.

11.—Plate Lifters

May be easily made from broken vulcanite trays by cutting pieces about $1\frac{1}{2}$ inches long by $\frac{1}{2}$ inch wide, and bending them over a flame to right-angles. When cool they will remain in this position, and if placed in a tray before the plate is put in, enable one to lift the plate out for examination without wetting the fingers.

12.—Reproduction.

In practice, subject your original to a top light, against some wall, or better, movable vertical artist's easel, at the foot of which attach a large sheet of cardboard, so hinged at the back that it can be moved up and down like the lid of a box, thereby reflecting the light upwards. Similar screens are arranged at the sides of the easel. For those who wish for a more complete arrangement, the following apparatus, which everybody can make for himself at a nominal cost, is recommended. Fix a longish stick in a baseboard so as to form a stand, then procure a piece of large cardboard; keep it white on one side, and blacken it on the other. By means of a string this board can be easily hung on to the stand at any height, and also by means of a peg interposed at the back, throw out the board to any required angle. Make two of these stands. When the white sides of these screens are placed obliquely against the original, it will further illuminate it, and can also be made to remedy any previous faults of lighting. When the black surfaces are used it will tend to deaden reflection of glass or highly albumenised surfaces. When shiny surfaces have to be photographed, avoid front light.

13.—Linoleum

Of uniform colour is very suitable for a background both out-door and in. It is not spoiled by damp, and shadings may be readily made on it, and easily washed off without damage to the material.

14.—A Simple Instantaneous Shutter

May be made out of a child's colour box. Two cardboard slides are made to cross over each other in order to have a central opening. One of the slides is held down by means of a steel spring; the other slide is attached to the former by a piece of string, which goes over a small wheel on the top of the apparatus. A piece of silk cord is fastened to this slide, and goes through the bottom end of the box. When this cord is pulled the slide comes down and pulls the other up; a catch in the side of the box now holds it. When the catch is loosened the spring pulls one of the slides down and the other up, so that the holes in the slides pass one before the other, and the exposure is made.

15.—Packing Wet Plates.

A good way of packing plates, whether wet or dry, so as to preserve their films from danger, even if wet, consists in taking a small square of American cloth, cutting out one of the triangles formed by its diagonals, doubling it over and gluing. It is better to make them rather larger than necessary, and then cut them to the required size.

16.—To Measure the Angle of View included on a Plate.

Having spread on a table a large sheet of paper, draw on it a straight line equal to the length of the plate that is to be used, eight inches for an 8 by 5 plate, ten inches for a 10 by 8 plate, and so forth. Now, from the centre of this line erect a vertical line a little longer than the focus of the longest of the series of lenses that are to be subjected to this examination. With a foot-rule measure off from the base line the focus of the lens, and put a mark on the vertical line, and then with a pencil draw lines from this mark to each end of the base line first made. If there are more lenses than one to be thus determined, then let this measurement on the central line, followed by the extension lines to the ends of the base line, be made in every case, and each angle thus made by the pencil will represent the angle of view included on the plate by that particular lens which was instrumental in having such angular markings effected. To *measure* the angles thus obtained, place a protractor so that its centre or zero coincides with that mark on the vertical line upon the sheet of paper, and note where the diverging pencil lines touch the scale on either side, and enter the figures in the note-book as the angular covering power of that lens on that size of plate.

17.—Another View-Meter.

The following is a suggestion for a very simple view-meter:—It consists merely of a jointed twelve-inch rule. By opening this to a V, and placing the apex against the cheek, it is easy to

observe the angle subtended by any object. A chord of degrees for a circle of six inches radius is marked along the upper edge of the camera back, or on the base-board. By applying the extremities of the V to this, the angle is read off, and a small table in the note-book tells at a glance what sized plate will be required for any of the lenses attached to the camera, or what lens should be used with a given plate.

18.—A Cheap and Serviceable Stand.

Having procured three broom-handles, as free from knots as possible, saw them about three parts of their length down the centre. Insert a screw just below where the cut is made to prevent splitting; then procure six small brass plates, shape of a dome, with three small holes; two bottom ones are screwed inside leg, top one to take pin of triangle. Then taper ends of each leg with spokeshave or plane to give them a little shape, insert screw at bottom of each, file off heads to prevent slipping. Then cut out triangle from a hard piece of wood; when done, insert a screw each side of triangle, filing off heads of screws; then give all a rub up with glass paper, stain, and varnish. When done, you have a strong and serviceable tripod, fit for any reasonable sized camera, at the bare outlay of one shilling.

19.—Changing Eastman Rolls.

On each end of the roll of sensitized paper gum a length—say about nine inches or so—of non-actinic paper, orange or yellow, then wind it tightly on the roller. With this arrangement you can open your roll-holder in broad daylight, and take out the exposed roll and insert a fresh one in its place, without the least fear of fogging any of the negatives; for the paper is so tightly rolled that the light can only affect the extreme edges of it, which is a matter of no importance, as there is a margin of a quarter of an inch each side, which is covered by the rabbet of the slide.

20.—Carrying Plates on Tour.

Get some tin or zinc boxes, made like ordinary plate boxes—for small sizes the last-named will do fairly well, although there is a tendency to split—and for each provide a piece of red Turkey twill, well washed and thoroughly dried. Fold up the exposed plates in the twill and place in the box, a rubber band keeping all tight. There is no need to put anything between the plates, and two or three plates will travel as well as a dozen, which should fill the box. The tin or zinc boxes will make available trays to develop an odd plate in now and then, to try exposures, but must, of course, be well washed and dried before using to pack plates in.

21.—Halation.

To avoid halation in interiors, the following procedure will be found useful :—Use any liberally coated plate—by preference one which has a fair amount of iodide in it—and give three or four times the proper exposure. Before development, soak for a few minutes in a ten-grain solution of bromide, rinse, and develop with about 1 grain of pyro, 1 grain of bromide, and 1 drop of ammonia to the ounce. Be patient, and do not increase the pyro, or fog is likely to result; but ammonia may be added as necessary.

22.—Mirror in Taking Portraits.

The experience of many portraitists shows that it is often advantageous to so place a mirror that the sitter can see his reflected image, most persons being less disposed to move when this is done than when there is no mirror.

23.—Changing Dodge.

A commercial traveller, also an amateur photographer, has displayed much ingenuity in getting over the difficulty of changing plates while on his journeys. "I travel a good deal by night," he says, "and have adopted the dodge of having a woollen bag, which I get inside, draw up, and tie round the neck. It occurred to me this bag might be very useful in photography, so I had it covered with Turkey red stuff, and whenever I want to change a plate I get inside—head first this time—tie it round my waist, and do the operation very comfortably."

24.—Another Changing Dodge.

Pick out a bedroom with as small a window as possible, at which, with the help of a few drawing-pins—say half-a-dozen—fasten a piece of ruby medium to the window-frame, over which let down the blind; next take the counterpane off the bed, and with three or four rather larger drawing-pins than those used for the window, fasten it to the top of the framework of the door, letting it fall to the ground, quite close to the door, so as to cover up the crevices at sides and bottom; be careful to lock the door first. You have now a perfectly light-tight room, which, with the aid of a little portable lamp, made of ruby medium, placed on a chair near a table or bedstead, on which to place plates and boxes, affords a very easy and efficient means of safely changing any number of plates.

25.—Handy Work.


In using a camera, while held in the hand, of $7\frac{1}{2}$ by 5, of rather heavy build, the following plan has been recommended : Have a brass button screwed into each side of the camera front

at bottom, to which attach a strap to pass over the head, the tail-board resting against the chest, to which it is pressed firmly by the left hand placed under the camera, leaving the right free to work the pneumatic ball of the shutter. Two brass knobs, which might be made in the form of the fore and back sights of a rifle, are screwed into the top of the front and back of the camera respectively, and pass through two holes in the focussing cloth. These form the sights, so arranged as to give the centre of the field "when brought into one." With a very little practice perfect steadiness is obtained and the horizon kept level, or so nearly so that a very slight waste of margin in squaring the prints will put it right.

26.—Substitute for Focussing-Cloth.

It is virtually a conical bellows made of thin, black, light-tight cloth (good black woollen sateen coat-lining answers admirably), in shape like a camera bellows, the wide end being kept in shape by a light oblong wire frame, same shape but a little less in size than the ground glass frame of the camera, to which it may be attached by two loops of strong elastic on each side, which are buttoned on to a corresponding number of pins, such as shield tacks or small screw nails, fastened into the *outer* sides of the focussing-glass frame. This holds the open or wide end of the bellows in close and light-tight contact with the focussing-screen. The other end of the bellows is closed by a thin oblong square of blackened wood (about 4 by $2\frac{3}{4}$ inches for a half-plate camera). In the centre of the wood a hole one inch in diameter is cut. The sides of the bellows are kept distended by a series of similar wire frames to the first, each a quarter of an inch each way less than the last, and sewn in position on the inside at suitable intervals, say an inch or an inch and a quarter apart, the wood end being a size less than the smallest frame. The whole folds into a quarter of an inch thickness, and draws out to about eight inches. It is drawn out by grasping the wooden end, and the eye placed close to the hole in the wood, the image to be focussed can be seen as distinctly as if the whole head was enveloped in the focussing-cloth, and the bellows being very flexible the eye can be brought opposite either centre or corner of plate as desired.

27.—Levelling Camera.

An ordinary stout steel knitting needle is softened at one end in the fire or gas flame, and with a pair of nippers turned, while still red hot, into a loop, and cooled by plunging into cold water. A couple of stout pins, with their heads cut off, are bent into a  shape, one of which, placed vertically at the side of the

swing-back, suspends the knitting needle to swing freely. The other, placed horizontal near the lower end of the swinging needle, limits the play of swing. The swing-back is carefully set vertical, and the position of the needle when at rest is marked. A suitable marker is obtained by cutting off the head end of a small pin, a quarter of an inch from the head, and driving into the wood flush with its surface.

28.—Keeping Unfixed Negatives.

Chrome alum and citric acid is stated to be of great service on journeys for bringing home the negative unfixed. The following is the prescription :—Sixteen grammes chrome alum and four grammes citric acid are dissolved in one litre of water, and in this bath is placed the developed and lightly rinsed plate, and development is at once arrested. After two minutes the plate is washed finally with a little sugar, then dried and packed. On arriving home, the plates must be well washed before fixing, otherwise the citric acid will decompose the sodium hyposulphite. This chrome alum bath is also an excellent means of clearing such plates as have become yellow through development with alkaline pyrogallol solution.

29.—Snow-Scenes.

In photographing snow-scenes, bear in mind that they require one-fourth the exposure that would be necessary for the same view in summer, and use a sky-shade to avoid reflections.

30.—Natural Background.

To make a background from nature, proceed in the following manner : Select a striking bit of scenery, or group of trees, &c., and photograph it. Print a *light* copy, fix (without toning), then with a pantograph, or similar arrangement, go over the outlines of the picture, reproducing it in an enlarged form on a stretched sheet of calico or canvas. The design may now be washed in and shaded, using distemper colours for the purpose.

31.—Burning Building, To Photograph a.

In photographing a "fire," get as near to it as possible. A detective camera is best, and the exposure should be brief, using a "rapid" plate.

32.—Changing Bag.

Take a piece of black silisia (double thickness) and form a bag 3 feet long by 2 feet wide, stitching a piece of tape around the open end to enable it to be drawn together. Then cut a piece 6 inches square from one of the sides, and insert a piece of ruby medium. To change, put the bag over your head and draw the tape tightly around your waist, the slide and the plates having been previously placed inside.

33.—Cloud Effects.

To obtain good cloud effects, observe the following rules :—
1. Use *slow* plates ; 2. *Back* them ; 3. Use a *rapid* long-focus lens *well stopped down* ; 4. Develop slowly ; 5. Exposure, one second.

34.—Dogs

May be made attentive by imitating the buzz of a bee.

35.—Exposure.

A curious but effective dodge for determining exposures is that of closing the eyes while under the cloth, then suddenly opening them and noting the time that elapses before the *details* of the picture are *distinctly* visible, taking this as the exposure.

36.—Focussing.

Always focus with full aperture, and never stop down more than is absolutely necessary.

37.—Finder.

A good view-finder is made by turning up the focussing screen until it stands vertically on the camera back, and attaching a light front above the front of the camera, containing a spectacle lens of the same focus as the lens in the camera, throwing the focussing cloth over all.

38.—Groups

Should always be arranged in semi-circular form, and as much in the shape of a pyramid as possible.

39.—Interiors.

If, in photographing an interior, you have to face a window, hang a red, yellow, or black screen completely over it while making the exposure, then cap the lens, remove the screen, and expose again for one or two seconds. By this means you will not only get the window clearly defined, but whatever may happen to be on the outside of it.

40.—Another Dodge

Is to expose by lamp or gaslight, leaving the camera open all night, and capping the lens just before dawn. Then, when day has fully broke, expose for the windows.

41.—Levelling.

If you are not possessed of a spirit-level, lay an oblong bottle of water (or any other solution) on the top of the camera. This answers equally well, and is handier.

42.—Posing.

In posing, it is always best to allow the sitter to maintain a natural pose, only correcting such *technical* inaccuracies as would mar the artistic result, or interfere with the lighting.

43.—Screen.

Mark the screen in nine equal squares, and remember that the *centre* square is the *weakest* point.

44.—Seascapes.

Use :—1. Slow plates ; 2. A good shutter ; 3. A single lens ; 4. A quick exposure ; 5. *Slow* development ; 6. *Plenty of patience*.

45.—Swing-Back.

A camera that has no swing-back can be utilised for taking high buildings, &c., by tilting up the base-board (if it is a hinged one), taking care to wedge it firmly when fixed into position.

46.—Telescope Dodge.

By fixing an ordinary telescope to the flange of the camera, pretty circular views may be taken of objects that would be too distant for the usual process, provided the camera is fitted with a bellows that suits the focus of the telescope.

47.—Rembrandt Effect.

Point the camera toward the source of light, with the sitter somewhat in profile. Expose quickly and develop slowly.

48.—Candle Dodge.

In photographing in a room, I have often found great advantage in using a candle flame as a guide to sharp focussing. If the light be very poor, and there is some difficulty in getting a sharp image, let the sitter hold a lighted candle in the same plane as his features. The operator can then focus the flame itself, and the picture will be all right in this respect.

49.—Improvised Developing Dish.

The travelling photographer need not carry developing dishes, if he will take with him a few sheets of parchment paper, such as jam pots are covered with, cut into pieces measuring two inches larger each way than his plates. These are readily made into dishes for temporary use by bending up the edges and holding the folded corners between American paper clips.

50.—Distemper for Photographic Backgrounds.

Take whiting $1\frac{1}{2}$ to 2 lbs., lampblack 3 ozs., damp blue 4 ozs., glue $1\frac{1}{2}$ oz. Dissolve the whiting in two quarts of water, add

nearly all the blue, then add the black, gradually drying after each addition by dipping in it a piece of paper and drying at the fire, till you get the exact colour required. Then, having dissolved the glue in warm water, pour it in, to keep the colour from falling off, mix thoroughly together, and strain through canvas.

51.—Softening Portraits.

By hanging a lace curtain between the sitter and the camera, the light will be very much softened, the threads of the curtain producing an effect similar to that of a chalk drawing.

52.—Hints about Screws.

When screws are driven into soft wood and subjected to considerable strain, they are very likely to work loose, and it is often difficult to make them hold. In such cases the use of glue is profitable. Prepare the glue thick; immerse a stick about half the size of the screw and put it into the hole; then immerse the screw, and drive it home as quickly as possible. When there is an article of furniture to be hastily repaired, and no glue is at hand, bore a hole, insert the stick, fill the rest of the cavity with pulverised rosin, then heat the screw sufficiently to melt the rosin as it is driven in. Where screws are driven into wood for temporary purposes, they can be more easily removed by dipping them in oil before inserting. When buying screws, notice that the heads are sound and well cut, that there are no flaws in the body or thread part, and that they have gimlet points.

53.—To Cure a Distorted Picture.

First of all, make from it a transparency by superposition in a printing frame, and, having erected this transparency in front of a plate of opal glass, by means of a camera fitted with a short-focus, non-distorting lens, and a swing-back, focus as sharply as possible with the largest aperture, and swing back the ground glass until the convergence of the building is seen to be neutralised, and the vertical lines rendered parallel. Now insert the *smallest* stop, so as to ensure top and bottom being equally sharp, and expose. The negative which results from this treatment will be rectilinear, and in every respect perfect so far as drawing is concerned.

54.—Steadying the Camera.

Have a hole bored through the head of the tripod screw, and suspend therefrom by a stout string a cabbage net. In the net put stones, or any other heavy and suitable object which may be handy at the time of exposure. The net should hang about a foot above the ground. In default of a net a pocket-handkerchief may take its place at a pinch.

55.—Another

Useful thing—either instead of or in addition to the above—is an india-rubber door-spring, a rather weak one, say about six inches long, and with an “eye” at each end, and to suspend this by one end from the tripod screen. Tie a thin cord to the lower end of the spring, and let the cord have a loop at its other end, into which the foot may be inserted. This loop should be about three inches above the ground when the tripod is set up. By inserting the foot into the loop and pressing the foot upon the ground the spring is stretched, and a great downward pull is exerted upon the camera, which holds it as firm as a rock.

56.—Sizing for Photographs.

Thick gum water with a little sugar added makes an excellent undersizing for photographs that are intended to be coloured in oil. The gum should be dissolved in cold water, and made just thick enough to work easily, and a little loaf sugar added after the gum is quite dissolved. Two or perhaps three coats may be required.

57.—Lens Caps.

Always have a cap for both back and front of your lens.

58.—Enlarging.

Supposing you have something you wish to enlarge as big as possible with your camera, rack the camera out to the full extent, and focus by moving the camera bodily (it is better to have the camera on a table than on the stand). You by this means ensure having an enlargement as large as possible with the camera used. This saves trouble when the focus of the lens is not known.

59.—Test for Vibration.

A good test for proving the vibration of the camera during the springing of a shutter, &c., is to place a glass tumbler filled with water on a sheet of glass or cardboard placed across the top of the camera. The slightest vibration will cause a ripple on the surface of the water.

60.—Storing Lenses.

Get a tinman to make a round tin box, say half inch longer than your lens, with *two* covers, one for each end; now pack each end with cotton wool, so that when the lids are on the lens will be snugly packed.

61.—To See Photographically.

Wear blue spectacles, use a blue glass focussing screen, or place a piece of blue glass in the diaphragm-slot.

62.—To Prevent Halation.

A piece of tissue paper placed lightly over the lens-hood when taking interiors, greatly softens the contrasts, and (to a certain extent) prevents halation.

63.—Focussing Screen.

By cleaning a plate, varnishing it, and then rubbing it all over with the ball of the thumb, an excellent screen may be made in much less time than by grinding one.

64.—Focussing.

Why try the eyesight when endeavouring to focus a greatly faded picture for the purpose of copying it? Place a good sharp photograph to focus by, and when fixed substitute the faded one for it.

65.—Packing Plates.

Pack exposed plates in a tin box; unexposed ones in a cardboard box. A piece of soft sponge placed in the box will prevent all shaking, and not dust or injure the films. Where the slide is inserted through a lid, fix two elastic bands to the lid to make it self-closing, and another evil is overcome.

66.—Softening the Light.

When an interior, such as that of a parlour, is photographed, a certain degree of hardness and patchiness often results from the windows being kept open during the exposure. A softer and better effect may be obtained by keeping the blinds down during the greater part of the time. This softens and diffuses the light, although it increases the time; just previous to closing up the camera the blinds may be opened to give the necessary high lights.

67.—Photographing Glass-covered Articles.

In the event of a clock or other article protected by a glass shade being in the picture, the shade should be removed from it during four-fifths of the exposure, by which means the whole of the details will be beautifully shown, the shade itself being also depicted in a softened manner, and the reflection from its surface then being not offensively strong. Of course the clock should be stopped during the exposure. The reflection from the glass covering of framed pictures can be got rid of by placing a cork behind one side or the other, as the reflection may demand.

PART II.—In the Dark-Room.

68.—To Save an Over-Exposed Negative.

When a plate gives evidence of over-exposure by flashing out too quickly, it should be instantly washed, fixed, and again washed to remove the hypo; then immersed in the following solution :—

Bichloride of mercury	...	...	...	20 grains
Alcohol...	...	...	...	$\frac{1}{4}$ ounce
Agitate, then add—				
Water ...	...	...	...	2 ounces

The plate should remain till quite white, then thoroughly washed, dried, backed with a good black varnish, such as Brunswick-black, &c., and *copied*.

69.—Restoring Fogged Plates.

Restoration to usefulness of a batch of plates which has been fogged by opening in white light may be effected as follows :—Light the orange lantern and lock yourself in your sanctum. Taking a glass dish which would hold a 5 by 8 plate, pour therein six inches of a solution composed of ten grains of bichromate of potassium to the ounce of water. In this solution lay the exposed plate, taking care that the liquid should cover its surface with one sweep. Allow the plate to soak about five minutes, then put it in clear water for an equal space of time. Soaking the plate in clear water for five minutes is sufficient to remove any superfluous bichromate. Treat the dozen of exposed plates in like manner, and place them on a drying-rack in a cupboard, where no actinic light enters. When dry, put them into their holders.

70.—Broken Negative.

First treat the negative with a solution of chrome alum, washing and drying, then immerse in a solution of hydrochloric acid one ounce to thirty ounces of water. Keep the dish rocking, and after a short time the film will commence to frill round the

edges. You can raise one corner to help it, but do not force it on any account, but let it soak for ten minutes or so longer, then try again. After you have successfully removed the film, transfer it to a dish of clean water, then get a slightly larger glass than the original negative, and, under water, bring it into contact with the film, and withdraw the two together. Press out all air-bubbles, and set aside to dry.

71.—Stripping Gelatine Films.

The most obdurate, under ordinary treatment in development and finishing, will give way with a little gentle coaxing after being placed in 'a *strong* bath of citric acid and chrome alum, with the acid in excess.

72.—Negative Paper in Dark-Slides.

Take a piece of thin, hard cardboard (black or brown) the exact size of the usual glass plate. Have the negative paper cut half-an-inch longer. Lay it film side downwards on clean board or glass, and lay the card on the back so that there is a margin at each end of about quarter-of-an-inch. Fold *one end* back over the end of the cardboard, and paste a little starch on the paper side of the folded edge; rub down on the cardboard; it fixes itself at once. Now take a pencil or thin lath, and place it across the middle between the card and paper. Spring the unfastened end of the card down to the paper, and fold and paste the paper over as before. When the pencil is withdrawn the card will be found slightly bent, and the paper stretched tightly from end to end. When in the slide the bent cards act as springs, the bend causing them to press against each other, and force the paper into the rebates. The paper is simply slit at each end to detach it from the card before developing.

73.—Another Method.

Take a sheet of tin exactly fitting into the rebate of the dark-slide; let this be serrated all round with V-shaped teeth, and let these teeth be bent alternately in contrary directions, so as to form an angle of 45 degrees with each other, in the same way as the teeth of a saw are set, the *set* being, of course, much more in this case than in the saw. Put the sheet of sensitive paper in the rebate of slide, and lay the tin thereon and fasten down in the usual way. Put the other paper in its place in the other rebate and close the slide. The teeth will press both papers against their rebates in the slide, and the only pressure being applied round the edges the paper will be kept in a good position. The greater the pressure the greater the expansion of the teeth, and so much greater the stretching of the paper.

74.—Dark-Room Light.

A very convenient arrangement for the dark-room is to have a frame about fifteen inches wide and high, and four or five deep. In the front uprights are grooves in which slides a pane of green glass; behind it is an argand gas-burner, provided with a yellow glass chimney. This gives an abundance of light, of a quality very agreeable to the eyes. There is a great difference in the light admitted by different specimens of green glass; the bright yellowish-green admits far less of the active rays than the others, and should always be selected. The difference shown by careful testing is far greater than would be at first supposed by mere inspection. An apparently slight difference in the shade may give a five-fold protection without diminishing the illumination.

75.—Fog.

Green and red fog may be got rid of by washing the negative after development in distilled water, then plunging it for twenty or forty seconds in a twenty per cent. solution of chloride of iron, and then placing it, without washing, in the pyro developer.

76.—Plate Washing.

A barrel or receptacle of some kind will be necessary to hold the washing water, with a tap close to the bottom. Then place the negatives to be washed in another receptacle containing a stretcher of some kind to receive them a few inches from the bottom. This will allow the hypo to fall, and, by having a tap in the bottom, the water can be thoroughly drained off. Of course, there must be a tub, or something of the kind, to receive the water after it leaves the tank.

77.—Plate Washing.

Get a tin box, such as a biscuit tin, about two inches deeper than the length of the plates to be washed, and about an inch wider. Cut some pieces of small cane the required length, and fix them across the box two and a half inches from the top, leaving enough space between the canes to admit two plates. The canes are fixed in position by driving through the tin from the outside some small nails called gimp tacks. When fixed, an india-rubber band about half an inch wide is placed round the tin, covering the heads of the tacks; this will prevent any leakage. One or two coats of Brunswick black, or Bates's black varnish, inside and outside, complete the tank, which is used as follows:—A bucket is placed on a high table or shelf, the tank on a chair or stool, and another bucket on the floor; a piece of gas tubing is bent into the form of a syphon, the shorter arm reaching to the bottom of the bucket on the shelf, and the longer arm to the

bottom of the tank ; another syphon, the short arm hanging about an inch over the top of the tank, the long arm reaching below the bottom of the tank outside, completes the arrangement. The plates, in pairs back to back, are placed in the tank, which is filled with water ; the upper bucket and the two syphons are also filled with water. A stream of water is thus set up (which will continue as long as any water remains in the upper bucket), and passes through the tank, and is eventually received into the lower bucket.

78.—Plate Washing.

The simplest of all plate-washing arrangements is to use a portable rack, somewhat after Tylar's make, and use either two tanks or a tank and a pail. Fill one with water about 85° or 90° F., and the other with cold water ; the plates should be soaked in alum after a good rinsing, and then put into the warm water and allowed to remain for ten minutes ; then take out and place in the cold water ; by repeating this three times all hypo may be considered as taken out.

79.—Reducing Clouds in Negatives.

Having taken a negative of a landscape in which there are clouds, develop it with one part ammonia developer and four of pyro. When developed, fixed, washed, and dried, cover the landscape portion of the negative with *vaseline*, then immerse it in a *strong* reducing bath. The landscape portion, being protected by the vaseline, is untouched, but the sky reduces rapidly, leaving good clouds on the negative, from which you can print or enlarge.

80.—Removing Metallic Stains from Negatives.

The appearance of a metallic stain round the edges of negatives is often a source of unnecessary anxiety to many workers. Its causes are multifarious, and not easily accounted for, but, fortunately, its removal is, in all cases, most easy. A pellet of cotton wool, wet with methylated spirit and gently rubbed over the stain, removes it almost at once. If the negative has not been dried the task is the easier.

81.—Iron Developer.

When using the iron developer, it is best to use in *place* of the ordinary iron solution a saturated solution of the double salts of proto-sulphate of iron and ammonia, as used in the old wet-plate days. For use make, No. 1.—A saturated solution of oxalate of potash to every 25 ounces, of which add 60 drops of hydrochloric acid. No. 2.—A saturated solution of proto-sulphate of iron and ammonia. For use generally, take No. 1 four parts,

No. 2 one part ; there is no need to use bromide. The advantages are, first, you can develop five or six prints with same developer, and get the tone of the last as good as the first ; second, the iron never deposits, but it will always keep clear, and when *mixed does not* lose its strength, but is good for months ; third, when required for under-exposed prints, you can use *one* of iron to *two* of oxalate of potash.

82.—Plucky Negatives, To Make.

Prepare a saturated solution of potassium oxalate (neutral). To each fluid ounce add eight grains of potassium bromide. Call this the *restrainer*. Make up a ferrous oxalate developer by pouring one part (by measure) of saturated solution of ferrous sulphate into three parts of saturated solution of neutral potassium oxalate, with constant stirring. Add to this one-half part of the restrainer if the picture has had a normal exposure. If you have reason to fear the exposure has been very much too long, you may add one or even two parts of the restrainer. This treatment will enable the operator to leave his negatives in the developer until the desired density be obtained without injuring the shadows by standing.

83.—Quick Proofs.

If you have taken by magnesium light a portrait, and wish to at once turn it into a lantern slide, you can accomplish your object as follows :—Develop and fix the negative, wash it hurriedly under the tap, then blot off the water and place the negative in the printing frame. Put in each corner a small piece of blotting-paper, and, laying a sensitive plate on the pieces of blotting-paper, which just prevent contact, put on the back of the printing frame, and, holding it firmly against the wall, turn up the gas for the proper time, and then develop and fix the transparency. The result will be as sharp as if the negative had been dry and the plates in contact. The transparency is soaked, after fixation and hurried washing, in methyated spirit, and dried.

84.—Clouds.

Clouds which are vastly over-exposed with a normal developer may be coaxed to a printing density with a slow developer, and then the foreground can be brightened up by having a dose of the alkali solution poured over it, keeping the sky part upwards, so that it is scarcely touched by this additional bath.

85.—Saturated Solution, To Make.

Get a glass funnel with fairly long stem, and a bottle provided with ring of cork and glass stopper (such as Rose's lime-juice cordial bottles) ; pass the funnel through the ring, and fill the bottle with water until it touches the end of the stem of funnel,

then run the funnel down tight into the cork ring. Put in the neck of funnel a large crystal of the salt to be dissolved, and pile up crystals over it, then add just sufficient water to reach above the big crystal. The arrangement is then self-acting, only requiring crystals to be placed in the funnel as they are dissolved. For larger bottles, an india-rubber ring from a soda-water bottle round the stem of the funnel answers equally well.

86.—Draining Racks.

Take a piece of board, say 20 by 6 inches, and with a marking guage set to 1 in. draw two lines along one surface of the wood 1 in. from each edge, then at intervals of about $1\frac{1}{2}$ ins. draw lines across the board; where the lines intersect drive in wire nails, leaving them sticking up about 2 ins. The negatives lean against one pair of nails, and are prevented from slipping by the pair in front, which again support another negative. Of course care must be taken that the film side of the negative does not come in contact with the nails.

87.—Brush Development.

In developing dry plates the use of a large, *round* camel-hair brush, with which to go over the plates during the process, will be found of much advantage, not only as a preventive of air-bubbles, but also as an important assistance in the process of development. By its judicious use local development can be made, and parts which, from the nature of the subject, require forcing can be brought out by the application of the brush charged with dilute ammonia to such parts, the plate being still in the original developing solution.

88.—A Rocking Table.

Take a piece of flat inch board, about 20 ins. by 8 ins. Draw a line down the centre of one surface. At 2 ins. from either end drive two screws, leaving the heads projecting about 1 in. File the heads of the screws to points. In the middle of the board, on the same side as the projecting screws, drive in a strong staple. Tie a stout string to the staple with a heavy weight at the end of it, and the whole arrangement is complete. To use it, put two tables of the same height together; on each put a penny, or any piece of metal, for the points to rest on, and you have a table that will rock for a long time. Instead of two tables a slot may be cut for the pendulum in an ordinary table or work bench.

89.—To Make Paper Negatives Translucent.

Place in a wide-necked bottle or jar—

White paraffine wax cut up in small flakes ...	6 ounces
Petroleum	2 "

Dissolve with heat on the hob, or, better, in a saucepan of hot water. Apply cold, with a piece of rag, to the back of the paper; hold the negative to the fire for a minute, and then place it between two thicknesses of blotting paper; afterwards press in a book.

90.—Negative Varnish.

Dissolve half an ounce of orange shellac in one pint of methylated spirit; when dissolved, add about two teaspoonfuls of fine ashes from a coke or coal fire, and shake well. The wax of the lac attaches itself to the ashes, and soon settles to the bottom, leaving the varnish quite clear, and it can then be filtered without difficulty; if too thin add lac, if too thick dilute with spirit. This is very hard, does not crack, and will stand any amount of sun-printing without becoming tacky. Varnished gelatine negatives sometimes become strongly pitted from accidental water splashings: for remedy, thoroughly remove the varnish with spirit, then soak the plate for some time in water, dry, and re-varnish.

91.—Mending Broken Porcelain Trays.

Cement broken parts together carefully with gutta-percha, keeping the pieces in position until set.

92.—Reducing Over-Intensification.

If, after treating a thin negative with bichloride of mercury, and blackening it with ammonia, it should be found too strong for ordinary printing, immerse the negative in a bath of sulphite of soda for a short time, and, on taking it out, a reduction of its acquired density will be found to have taken place. The strength of the bath may be that of a saturated solution.

93.—Reducing Over-Development.

Dilute ordinary chloride of lime with half its bulk of water, and immerse the negative; in about twenty seconds, depending on the quality of the gelatine, the film will have acquired a slimy condition, which can easily be ascertained by the touch. Now remove from dish, and with the finger or soft pad gently and evenly rub down. The density can thus be reduced at will, a final wash completing the operation.

94.—Removing Undeveloped Image.

A gelatine plate which has been exposed to light, or had a camera exposure, can have the consequent fog or undeveloped image removed, and the plate made available for another exposure. This is done by simply soaking in a five per cent. solution of bichromate of potash, well washing, and re-drying.

95.—Paper Trays.

Willesden paper of a proper thickness answers well for developing trays, also for alum, hypo, and washing baths. To make them, cut the paper to the size required, draw lines parallel to, and equidistant from, each edge, and turn up on these lines the portions thus forming the sides of the tray. Wetting the paper first helps the operation. Three of the projecting corners should be fastened with string, or, better, with a small spring clip. A copper one used for picture-hanging answers well. The fourth corner is left for pouring from. These trays may be carried flat when travelling, or pieces be taken on a journey for emergencies. Capital water-tight packing cases that wear well can easily be made with it.

96.—Boxes for Dry Plates.

Dry plates packed in groove boxes are difficult to remove one at a time. To make the operation easy, cut away from the top of each end of the boxes just sufficient to allow a finger-hold on the top corners of each plate.

97.—Fixing Baths

Are readily made from a saturated solution of hypo of soda made in a wide-mouthed bottle, on the neck of which is kept a footless wine glass, to be used as a measure, and keep out dust. Saturation is maintained by always having undissolved crystals in the bottle. When mixing according to the usual formulæ, a glassful is the "one part," and "— parts" so many glassfuls of water.

98.—Plate-Raiser and Brush.

An old quill pen is useful—the quill part to raise the plate from the developing solution, and the feather part to cleanse the tray with when development is finished. A brush for this latter purpose may be made by tying a piece of lamb's-wool cotton on one end of a strip of wood.

99.—Yellow Varnish

For the inside of dark tents or boxes is easily made by mixing chrome yellow with methylated French polish. It can be applied with a brush, and dries quickly. Stephen's ebony stain is handy for blacking apparatus.

100.—Canary Medium.

When canary medium or other paper is used in lighting the operating room, place it between squares of glass to protect it from smoke, fracture, and splashes.

101.—Silver Intensification

Gives a result which may be relied upon as permanent. After fixing, wash the plate thoroughly, and then immerse in an alum bath. Rinse well under the tap, and apply a mixture of two grains of citric acid and three grains pyrogallie acid to the ounce of water. After allowing this to soak in for a minute, pour it off into a measure in which two or three drops of a twenty-grain solution of nitrate of silver have been placed, and pour this over the surface of the negative.

102.—Blocking-Out Skies, &c.

Take a piece of Indian ink, and, with a little water, rub on a palette with the admixture of a small portion of orange chrome, until the substance becomes sufficiently opaque; this can easily be ascertained by applying a little of it with a brush on a piece of clear glass. By this mixture, applied with a sable pencil, any outline or delicate part of the negative can be effectually traced over, and thus blocked out with ease. Moreover, should any mistake have been made, and too much of the picture covered over, the damp corner of a cloth or piece of rag can soon remove the colour and restore the desired part. Any other part of the negative not covered by the aforesaid mixture can easily be filled in with Bates's black varnish, or any other suitable substance.

103.—To Dry a Gelatine Negative Quickly.

After being fixed and well washed, lay the negative, face up, on a sheet of blotting-paper, and, covering it with another sheet of blotting-paper, rub the hand all over the surface until the negative is surface dry. Then place it in a current of air for a few minutes. A cambric handkerchief or soft towel will answer instead of blotting-paper. If the negative be immersed in alcohol, it will absorb and displace the water in the film, and thus permit of a quick drying by the agency of heat if necessary.

104.—To Remove Pyro Stains.

Pyro without silver brings stains, which are, however, quickly removed by moistening the hands with a dilute solution of almost any acid—hydrochloric, nitric, or citric.

105.—Restoring Discoloured Negatives.

When the varnish of a negative becomes discoloured from long use and exposure, and the printing qualities become consequently impaired, lay it down, face up, in a flat dish, and pour over it some alcohol, waving it backwards and forwards over the plate by gentle tilting. In two or three minutes the varnish will be removed. Wash with fresh alcohol, dry, and re-varnish.

106.—To Prepare a Negative for Retouching.

Mix as follows :—

Gum dammar	...	...	...	6 grains
Turpentine (rectified)	...	...	...	1 ounce

When dissolved, filter through absorptive cotton, and apply this to the film all over with a piece of wash-leather. This medium is also very good used after varnishing as an ordinary retouching medium. A weak solution of resin in turpentine (about fifteen grains to the ounce) will also answer well.

107.—A Quick Filter.

Take a clear piece of chamois-skin, free from thin places, cut it of the desired size, wash it in a weak solution of soda or any alkali to remove the grease, and rinse thoroughly in cold water before using. Tinctures, elixirs, syrups, and even mucilages are filtered rapidly. A pint of the thickest syrup will run through in four or five minutes. By washing thoroughly after each time of using, it will last a long time.

108.—To Recover Silver Bromide from Waste Emulsion.

Let the emulsion be melted, and then add a small quantity of hydrochloric acid, following by boiling for two or three minutes. The silver bromide precipitates, and the destroyed gelatine is then poured off. The bromide is then placed among the other residues for reduction.

109.—To Remove a Cork from the Inside of a Bottle.

With a stout string projected into the bottle, turn the bottle around until the cork is caught in a loop of the string, and, with force, pull out the cork.

110.—Iodide Intensifier.

Make a saturated solution of bichloride of mercury in water—say a Winchester three parts full. Of this take two ounces, and add to it in small quantities (stirring the while with a glass rod till each addition is dissolved) about two drachms of iodide potassium. A bright red precipitate is formed immediately, and the iodide is added until this precipitate is dissolved. If two drachms should not be found sufficient for the purpose, add more ; if too much, stop when the result is obtained. One drachm of iodide to one ounce saturated solution of mercury will be found generally to be about the right quantity. Add sixteen ounces of water, and it is ready for use. To intensify, thoroughly wash the negative after fixing, and proceed with two ounces of the above for a half-plate till the required density is obtained ; then thoroughly wash, and fix in a weak solution of hypo for a short time, after which wash thoroughly, and dry.

111.—Developing Lamp.

Get one of Clarke's Fairy Lamps, such as are advertised every day, which costs about half-a-crown; let the globe be of opal glass, and paint the white glass receptacle below, in which the light rests, two or three times over with a varnish made of aurine dissolved in spirit; then cut out of a sheet of golden fabric or yellow paper a piece which will go twice round the globe of the lamp, fasten this in the form of a tube by a couple of ordinary paper fasteners; it ought to be about nine inches deep, so as to reach a good way above the top of the lamp; then light the lamp, put on the globe, and round this put the yellow tube.

112.—Removing Varnish from Negatives.

Put the negative face downwards, in a flat dish, propping it up by the corners only, and pour on sufficient hot spirit to cover the negative, placing a flat glass on the top. Renew the alcohol three or four times at intervals of a minute or so, then wash well with water if required to intensify or reduce. If a clean dish is used, the alcohol can be added to the stock of varnish; but if the developing dish is made use of, it should first be rinsed with acid, and then washed and dried. Care should be taken not to rub the film until the varnish is dissolved off.

113.—To Fill Cracks in Varnished Negatives.

Take finely-powdered lamp-black and rub gently, with circular motion, all over the negative. Use the finger or soft piece of wash-leather for the purpose. If properly done, the cracks will almost disappear.

114.—Partial Intensification.

By diluting india-rubber solution with benzine, it can be brought to a consistency which enables it to be applied with great accuracy with a camel's hair paint brush; and with the high lights thus waterproofed the whole negative can be immersed in the intensifier until the darker portions are brought up to sufficient density. When dry, the india-rubber has only to be rubbed off with the finger.

115.—Safe Method of Reducing.

A solution of hyposulphite of soda of such a strength as is commonly used for the fixing bath is made up, as also a saturated solution of red prussiate of potash. Twenty or thirty drops of this latter solution are dropped into each pint of hypo solution, and the negative to be reduced is placed in the mixture. Almost immediately a slight but quite perceptible reduction of density will be seen. The action, however, very soon ceases, and

if a greater amount of reduction be desired, a few more drops of the red prussiate solution are added, and this operation is repeated till the desired effect is produced, when the negative is thoroughly washed and dried.

116.—Removing Silver Stains from Negatives.

Soak the plate for five minutes in clean water; meanwhile make a solution of iodide of potassium, 20 grains to an ounce of water; put the plate in this solution, and let it stay for ten minutes. If the stain is very old, keep it in for half an hour. Now dissolve half a drachm of cyanide of potassium in one ounce of water. Put the plate into this, and gently rub the stains with a tuft of cotton-wool, free from grit, until they are quite gone. If the stains are very old, make the solutions stronger, and soak for a longer time.

117.—Solution of Pyro Ready for Use.

Pyrogallic	...	...	...	...	...	1 ounce
Citric acid	...	...	...	...	...	60 grains
Water	...	...	...	...	...	109 ounces

Dissolve the citric acid in water, and add the pyrogallic. The solution will contain four grains of pyrogallic to the ounce of water, and will keep good for months. For convenience, half the quantity of water may be used, when the strength will be eight grains per ounce. In using it, dilute according to formula employed.

118.—To Cure a Frilled Plate.

Fix as usual, and wash it well, being careful not to handle the film at all, nor to let it slip down the sink. Place in an alum bath, and wash again. Then take a perfectly clean glass plate the original size of the negative, and lay it on the bottom of a dish containing methylated spirit, in which the film will be placed. If this has not left the glass entirely, it may gently be drawn off, which, if the film be at all subject to blistering, will be very easy. Put the film in the spirit, and spread it as evenly as possible on the glass plate. Then, on slowly raising the glass, the gelatine film will spread out uniformly, and the whole may be removed from the dish and put out of the dust to dry.

119.—Using Negative Paper.

A simple and effectual plan to use the usual negative paper as now sold is to fix it to a clean glass plate, by means of a few strips of gum paper, then, after the developing, fixing, and washing, dry them by placing them on Winchester bottles, film up, and keeping them in place by a pair of india-rubber bands until quite dry; they will then be quite flat, and remain so.

120.—Developing Stripping-Films.

Before developing, soak the negative in cold water until quite limp, then place it face upwards in the empty developing tray, and pass a soft, wet camel's-hair brush over the film. By this means air-bubbles are removed and also the negative is made to adhere to the bottom of the tray, so that the development is carried on more easily, and a smaller quantity of the solution is required. Be careful to use no alum in the fixing bath or elsewhere, otherwise the paper will not strip off.

121.—Clearing Negatives.

Dilute sulphuric acid is an excellent clearer for dry plates. The mixture for clearing a half-plate is 6 m. of acid in 2 ounces of water, allowing it to cool after the addition of the acid.

122.—Increasing Density.

A very simple way of increasing the density of any portion of a negative is to mix some of Judson's yellow or orange dyes with half an ounce of gum senegal, and apply thinly with a camel's-hair brush moistened with saliva. It adds enough density to parts of the negative required without shutting out the detail.

123.—Easy Method of Darkening a Room.

Procure an ordinary blind roller fitted with cord, rack, and pulley, or other means of drawing up and down, and fit the roller at the top of the window. For the remaining three sides of the window-frame cut some strips of "carpet" or other strong brown paper about six or eight inches wide, crease these down the centre lengthwise, and glue together with thin glue. While the glue is still moist, fold the strips again down the centre, and put on one side to dry. These will form grooves one and a-half or two inches in width, and should be tacked on the two sides and the bottom of the window-frame, open side inwards. The blind is made of one thickness of black calico or linen and one thickness of carpet paper, tacked on the roller in the usual way. The blind is made just wide enough to work in the paper grooves which have been fixed round the window. A close-fitting valance of black material is fixed up over the roller, and the arrangement is complete. Where it is considered desirable, the whole or part of the blind might consist of some translucent red or yellow fabric.

124.—Writing Titles on Negatives.

Take a piece of talc, carte size, and cut it into small strips sufficiently long and broad for the purpose. Upon these slips of talc, with either medium previously mentioned, write the title of the negative in the usual way. It is more effective, however, to

have the wording in very small block letters, known to printers as sans-serif. Lay the talc, with the inscription upon it, aside to dry. During the drying take up the negative and, with a soft silk handkerchief, very gently clean, locally, the spot decided upon for the talc tablet. With a camel's-hair brush charged with colourless varnish, and one that dries transparent without heat, brush over the place decided upon on the negative for the tablet. Now take up the strip of talc with the name on, and carefully adjust it into position—of course with the written side from you—on the wet varnish. Gently rub the back of the talc to ensure perfect adhesion between the surfaces, and set aside to dry. This is a very neat and simple plan, and if the talc is thin, no marks will be detected on the negative or print. It is, of course, understood that the negative has been varnished before adopting this plan.

125.—To Obtain a Negative from a Negative by Development.

Expose, say, an Ilford ordinary plate under a perfect but "thinnish" negative at about six inches from a No. 3 Bray burner gas flame for about forty-five minutes. Develop with—

Pyrogallol	...	...	...	...	4 grains
Ammonium hydrate	...	...	...	...	1 to 2 minims
Water	...	...	...	...	1 ounce

Bromide may be added if desired or required. It will be difficult to see the progress of the high lights through the slight fog, so it is advisable to use a slow developer, though a normal one—pyro or iron—will give good results.

126.—To Obtain a Reversal with a greatly Under-exposed Plate.

Expose in the camera, and attempt to develop with an iron developer of the maximum strength, and just before the high lights (first points to attract silver) begin to appear, add as much of a concentrated solution of hypo as will not fix the plate. A red image, positive, abounding in detail even in the deepest shadows of the subject, will soon make its appearance.

127.—Fixing in Ordinary Light.

It is not sufficiently well known that there is no occasion to fix in the dark-room light. As soon as the developer is well washed off, ordinary light may be admitted. Indeed, it is in accordance with common sense to fix in ordinary light; for whether the parts of the film unacted on by the developer be exposed to light or not, they will be dissolved out by the fixing solution, and there is an end of them.

128.—Cleaning Backs of Plates.

After the plates get their final washing, place them in the draining rack back to back. Of course the grooves must be wide enough to take the two plates. This arrangement, whilst allowing the films to dry, keeps the backs damp, and, necessarily, the waste emulsion soft. When the film sides of the plates are perfectly dry, the backs are easily wiped clean with a cloth dipped in a little whiting and water, without any danger of injuring the negatives.

129.—Green Fog, To Cure.

Immerse plate in a mixture of equal parts of a solution of potassium bromide 20 grains to the ounce, and ferric chloride, about same strength. When the plate is bleached, wash, and redevelop with ferrous oxalate.

130.—Developing Without a Lamp.

A very simple plan of developing negatives without the least fear of fogging them, although within twenty-four inches of the naked flame, consists merely of placing a candle or lamp on a shelf in the dark room, behind a screen composed either of a piece of wood eighteen inches square, a pile of books, or cardboard boxes sufficient to hide the direct rays.

131.—Accelerator with Ferrous Oxalate.

The addition of a few drops of a very dilute solution of hyposulphite of soda to the ferrous oxalate developer will act as an accelerator, and give increased density.

132.—Varnish for Backing Positives.

Spirits of turpentine	...	...	...	6 ounces
Asphaltum	...	...	...	2 "
White wax	...	...	...	2 scruples
Lamp black	...	...	...	1½ "

Dissolve in a warm place, and filter through flannel.

133.—Filtering Varnish.

Make a paper funnel of writing-paper, gum it up so that it will not come undone, and cut off the point so as to leave an orifice large enough to admit a pencil. Into this hole push from the inside a tuft of cotton wool, and pull it through the opening to such an extent that it is firmly held there. Now prop this extemporised filter above a clean, dry bottle, and pour in the varnish above. It will filter out bright and clear.

134.—Cleaning Backs of Plates.

It is a good plan to keep near the developing-sink a small box of powdered pumice-stone, and a piece of sponge. If the latter

be moistened and dipped into the powder, it presents a ready means of cleaning the backs of plates.

135.—Developing Dish Screens.

They may be made of cardboard or tin, or almost any material, but best of thin sheet iron, and painted red. They should be large enough to well overlap the dish, and cover and surround it, resting upon the table, and protecting the dish beneath completely from the light. They should be provided with a stout wire handle in the middle of the back. With one of these we can cover the developing dish, turn up the gas, and read or do other work, as desired, the plate steadily and safely developing all the time. They also enable one to go in and out of the dark room as desired.

136.—Restoring Fogged Emulsion.

If it be known either that light has had access to the emulsion or the plates, there is a remedy which should be adopted. The emulsion, when set, should be squeezed through canvas into water containing ten grains of bichromate of potassium to the ounce, and allowed to remain there for an hour. Afterwards it must be washed in many changes of water, to get rid of the bichromate. Emulsion so treated does not seem to have its sensitiveness in the least diminished, whilst any ill effect that light may have had on it is effectually removed.

137.—Frilling, To Cure.

Soak in a solution of alum 1 oz., water 4 ozs., gum dammar 1 dram. The gum prevents the film leaving the glass on drying.

138.—Halation

May be prevented by coating the back of the plate with the following mixture :—

Powdered burnt sienna	...	...	...	1 ounce
Gum arabic	...	...	...	1 „
Glycerine	...	...	...	2 ounces
Water	...	...	...	10 „

Apply with a camel's-hair brush, and remove before development with a wet cloth. It may be cured (to a certain extent) by rubbing with a piece of chamois leather dipped in methylated spirit.

139.—Handy Developer for Tourists.

Sulphite sodium	...	...	...	$\frac{1}{2}$ ounce
Washing soda	...	...	...	$\frac{1}{2}$ „

Dissolve in 8 ounces water. For each $\frac{1}{4}$ -plate take 1 ounce of the above solution, and add 3 grains dry pyro. Modify with bromide if necessary.

140.—Cleaning Stained Hands.

Pour a saturated solution of chloride of lime on to the hands and work it about all over them ; then take a crystal of citric acid and use it like soap, or like a nail brush. The acid liberates a pungent gas, which is very active as a decolouriser ; and pyro stains which resist either of the agents employed separately, yield rapidly to the product which is given out by their combination.

141.—Over-Exposure.

On a plate showing signs of this oft-recurring evil, at once dilute the developer with double the quantity of water, and work up the density by constantly adding small doses of pyro.

142.—Pyro, To Preserve.

To make pyro keep good in solution for a considerable time, mix it as follows :—

Pyro	...	...	...	...	1 ounce
Citric acid	...	...	...	...	30 grains
Water to make	...	...	...	...	10 ounces

143.—Reducer, A Simple.

Immerse the negative in a solution of—

Copper sulphate (blue-stone)	...	...	4 ounces
Alum	...	...	4 "
Common salt	...	...	8 "
Water	...	...	1 quart

When sufficiently reduced, wash in plain salt and water, then in water alone, and set aside to dry.

144.—Restrainer.

Citrate of ammonia is a good restrainer.

145.—Ruby Lamp, To Make.

Procure a piece of stiff cardboard, 18 inches by 12 inches, and divide it by pencil marks into three equal parts, each 12 inches by 6 inches. From the middle portion cut out a square 8 inches long by 6 inches wide. Now with a penknife score down the lines you have made, and bend back the sides to form a triangle. Glue a piece of ruby medium inside the middle portion over the aperture, and sew up the ends of the triangle. Place a candle inside, and a triangular piece of tin with a few small holes in it to afford ventilation. on the top, and you can open your box of plates without fear of fogging.

146.—Saturated Solution, To Make a.

Three-quarters fill a jar with water, and, having placed the crystals in a muslin bag, suspend it so as to be enveloped by the

water, but without touching the bottom of the jar. Solution immediately commences, and the water speedily becomes saturated.

147.—A Rapid Way of Dissolving Hypo.

Procure a wide-mouthed bottle and insert a funnel, the neck (of funnel) being *loosely* packed with tow or cotton wool; place hypo in funnel, and pass warm water through till hypo is dissolved and the solution reaches a mark previously made on the bottle to indicate the quantity wanted, *e.g.*, four ounces to the pint.

148.—Soda Developer.

The simplest developer of any is the washing-soda developer. Take $\frac{1}{4}$ lb. ordinary soda, and dissolve in 1 quart water. Use 2 ozs. of this for a half-plate, with 3 grains dry pyro, using bromide only if it wants restraining.

149.—Spoilt Negatives, To Clean.

Soak in warm water in which a little hydrofluoric acid has been mixed, and the films will float off.

150.—Under-Exposure.

Plates that are *known* to be under-exposed are improved by keeping a few weeks before developing.

151.—Varnish.

A good retouching varnish is—

Sandarac	...	...	...	...	1 ounce
Castor oil	...	...	...	...	80 grains
Alcohol	...	...	...	...	6 ounces

First dissolve the sandarac in the alcohol, and then add the oil.

152.—Washing Negatives.

There is no better method of washing plates than to place them in a rack, put the rack into an old wash-tub with a hole in the bottom, the sides supported by two bricks, and turn on the tap.

153.—Negatives for Mechanical Work.

Photo-mechanical plates are very much slower than ordinary dry plates, so that the dark room may be illuminated as for wet plates, and should be so when using them, so that the operator can judge accurately when the development is complete. When it does happen that the negative is not sufficiently intense, the following intensifier will be found efficient; but, first of all, the negative must be thoroughly washed, then soaked in a saturated solution of alum to which ten minims of nitric acid has been

added to each pint ; again well wash, then bleach in a solution of—

Bichloride of mercury	...	...	...	1 ounce
Chloride of ammonium	...	...	...	1 "
Water	...	...	...	20 ounces

When dissolved, add five drops hydrochloric acid. When the film is bleached right through, wash well and immerse in a solution of cyanide of silver, made as follows :—

Cyanide of potassium	...	...	...	1 ounce
Water	...	...	...	20 ounces
Nitrate of silver	...	...	...	1 ounce
Water	...	...	...	5 ounces

Dissolve separately, then add the silver solution to the cyanide solution, stirring all the time ; add three or four drops of nitric acid, filter, and it is ready for use. At first, in mixing the two solutions, a precipitate will form, which, however, will gradually be redissolved. When the bleached negative is well washed, it is immersed in this solution until quite black, then removed and again washed.

154.—Blisters in Stripping Films.

After the films are fixed and well washed, those which show any blisters are taken, and the paper backing is broken with a pin or the point of a penknife, and put into a dish containing methylated spirit, and allowed to remain in this bath about ten minutes ; the water is all drawn out, and the blisters in the films reduced to their original dimensions ; they are then gently pressed with the finger, being careful that they do not get into folds, and placed on a collodionised plate, squeegeed down gently, and put under pressure.

155.—Stains for Dark-Room Windows.

Water	...	...	...	100 c.c.
Gelatine	...	...	...	5 grammes
Nitrate of silver	...	...	...	1 gramme

Glass coated with this solution is exposed to light until it assumes a reddish brown tint ; it is then washed to eliminate the nitrate of silver. A surface is thus obtained through which the actinic rays do not pass. The colouration may be deepened by increasing the proportion of nitrate of silver up to three or even four grammes. Glass tinted in this way may also be used to shade the dark-room lantern.

156.—A Handy Brush.

It consists merely of a sponge, which has perhaps one-half

or three-quarters of its bulk stuffed into a short, wide-mouthed bottle. This brush is very cleanly and pleasant to handle. It is inexpensive, and can be made in a few moments from materials which are to be found in every laboratory; and it can be quickly and thoroughly cleansed by pulling it apart, and washing its component parts. Almost any desired stiffness of touch can be obtained by selecting a sponge more or less harsh in its texture, and by letting it project from the bottle to a greater or less extent. Such a brush is particularly suited for applying paste to the backs of prints when mounting them, inasmuch as it never sheds any bristles, nor leaves any bristle tracks or ridges in its wake; and, when temporarily out of use, it can be stood up erect on the flat end of its handle, and in this position, though fully charged with paste, it collects no dirt on itself, and does no harm to other things. Two or three of these implements standing about in his dark room give a photographer the means of promptly and neatly sopping up any corrosive or staining fluids that may be accidentally spilt, without even soiling his fingers.

157.—Examining Negatives.

When a plate is examined during development by lifting from the tray to look through it, lines are often caused by the developer running downwards. This evil may be avoided if the plate is continually turned when upright, and on returning to the tray flow the liquid in all directions.

158.—Varnishing.

The best way to varnish with spirit varnish is the following:—The room must be about 65° Fahr.; warm the plate as usual, and flow the varnish. Do not rock the plate, but place it as held when draining in a rack. After two or three minutes the crapiness will disappear; it must then be heated again as usual. This way has two advantages: firstly, a more glassy surface; and secondly, no chance of “firing” the plate, which often occurs if warmed directly the varnish has run off.

159.—Removing Halation.

The remedy found most useful is to rub the portion of the negative affected by the halation with a piece of chamois leather wetted with methylated spirit. The best way is to cover the top of one finger with the chamois, and rub the negative with a circular motion, changing the part of the chamois as it becomes black, and taking care to keep it well wet with the spirit. When portions of a negative are found to be over-intense, they can be reduced by the above method.

160.—Developer for Gelatino-Chloride Plates.

Dissolve one ounce of pure citric acid in four ounces of distilled water. Measure out four ounces of the solutions so formed, reserving the other portion, and neutralise the four ounces with solution of ammonia (liquor ammoniæ), adding it carefully in small quantities at a time, and testing with litmus paper after each addition. When perfectly neutral, add to it the reserved portion of citric acid solution, and five grains of common salt. This forms the solution of ammonium citrate. A solution of ferrous sulphate is now prepared by dissolving two drachms of the salt in one ounce of distilled water, acidified with a drop or two of sulphuric acid. To develop, use three volumes of citrate to one of iron.

161.—Spots on Negatives.

Many persons who develop negatives by means of ferrous oxalate complain of transparent spots in the negative. This is almost invariably the case when the negative is immersed in the developing solution directly it is taken out of the slide. It arises from innumerable air-bubbles caused by the solution not taking kindly to the whole surface of the plate. It may be entirely avoided, either by the application of a tuft of cotton-wool to the surface of the plate immediately after it is immersed, or by wetting the gelatine surface of the plate with plain water before transferring it to the developing dish. Some plates have a surface very repellent of water, and to these the air-bubbles will adhere tenaciously, requiring smart friction to dislodge them.

162.—A Frequent Source of Fogging

Arises from the blacking being worn off the inside parts of the camera and lens tube. An excellent dead-black for coating the inside of cameras and lens mounts can be made by dissolving shellac in methylated spirit, and adding dry lampblack till the mixture is of the consistency of thin cream. This should be laid on with a soft brush, and it dries very rapidly; but if too much shellac is used, the black will dry glossy. With a larger proportion of shellac and less lampblack, this makes a splendid black polish; but in this case it must be applied with a linen pad in the same manner as French polish.

163.—A Good Rocking Pendulum

Consists of a simple rod of wire scarcely so thick as a common pencil; its length may be from forty to sixty inches. To the lower end is fixed a heavy cast iron weight, the heavier the better, the upper end terminating in a hook, the end of which is bent back upon itself so as to project for about an inch at a

right angle to the rod, and nearly level with the top of the hook. Cut a hole in the work-table of sufficient dimensions to permit of the hooked end of the pendulum being passed up through it, and then insert through the hook a triangular bit of steel, such as a piece two inches in length broken from a small file of the class used for sharpening saws, which, after being softened by heat, must have one edge filed or ground smooth, although not absolutely sharp. A pendulum suspended in this way will, after being started in motion, continue to vibrate for nearly an hour ; this however, depends upon the weight of the bob.



PART III.—In the Printing Room.

164.—To Ascertain the Strength of a Silver Solution.

If the solution contain nothing but nitrate of silver, then may the argento-hydrometer be employed in the certainty of its affording a fairly accurate idea of the number of grains of the salt contained in each ounce of water. But this specific gravity test quite fails in the case of a silver solution which, from having been long in use, contains other matters. In this case, a test solution composed of pure chloride of sodium eight and a half grains, dissolved in six ounces of distilled water, must be prepared. To use it, place one drachm of the bath solution in a two-ounce bottle, rinsing out the minim measure with a drachm of distilled water and adding to the other. Pour in the salt solution slowly, and with occasional shaking, until no further precipitate takes place. Having noted how many drachms it has taken to effect this end, multiply this number by four for the weight in grains of the nitrate of silver present in an ounce of the bath solution. If pure chloride of sodium be not procurable, commercial chloride of ammonia may be substituted, seven and three-quarter grains being dissolved in six ounces of water.

165.—On Printing Titles.

A white title can be printed on views by writing with liquid Indian ink on tracing paper. Let the label remain until thoroughly dry, cut away excess of paper, or as close as you can trim it to the writing, place the ink side next to the varnish, and hold in position while you touch a drop of varnish to the edge, when the varnish will at once run under the label, rendering the tracing paper transparent; and if you have made a neat label, you will find a clear, distinct, and perfect label printed on white on your views without a trace of varnish or paper showing.

Should you want a printed job, take tracing paper, which must be light weight, as too thick paper, in printing or writing, will curl and cockle all out of shape. Take plain-face type, use blue-black ink, size, and dust with carmine bronze.

166.—To Bleach Discoloured Prints.

The soiled paper, print, or engraving, is to be first placed in a bath composed of a quarter of a pound of chloride of lime, and the same of soda, to about a quart of water, and allowed to remain till the paper has regained its proper tint. Next, it is removed with the utmost care into a dish of cold running water, and allowed to remain for at least six hours, the chloride of lime being by that time removed. When the paper is thoroughly dry by exposure, it must be dipped into a third bath of size and water, which will restore its firmness. Finally, it is placed between printers' glazed-boards and passed through a press, which will restore the original smooth surface, in which condition it will be suitable for photographing. If prints are stained by oil, grease, coffee, candle drippings, or ink, different treatment will be needed. Hydrochloric acid diluted with five times its bulk of water forms the first bath, and into it the engraving is placed, for not longer than four minutes, and then carefully washed as above. A grease spot is to be removed by placing the sheet between two pieces of blotting-paper, or covering with powdered talc, and applying a heated iron to the spot, which will melt the grease and cause it to be at once soaked up by the porous paper. Dirty finger-marks are to be removed by covering them over with a piece of clean yellow soap for two or three hours, and then washing with a sponge and hot water. The sheet is afterwards dipped in weak acid and water, followed by another hot water bath, and ultimately by cold water. Ink stains are to be destroyed by dipping the paper into a strong solution of oxalic acid, and then into one of hydrochloric acid and water (one to six); finally, the usual continuous cold bath.

167.—Making Printing Frames from Old Negatives.

Amateur photographers often do not know what to do with old or spoiled negatives, and sometimes need a greater number of printing frames than they possess. The connection between these two facts consists in this—that the old negatives may very easily be turned into printing frames, or rather, printing contrivances, for there is no frame needed; but we will call them frames for convenience. To make a printing frame for half-plate photos we only require two old quarter-plates. Cut a piece of strong black linen a little larger than two quarter-plates placed side by side, and paste them down securely in that position to the linen;

place this on a flat surface, and lay a heavy weight upon them until quite dry, then trim off the linen to the exact size of the glass with a sharp knife. Next procure four spring clips, and the printing frame is ready for use. To make a print, place a piece of sensitised paper of the required size upon the negative, and then a piece of white blotting-paper, half-plate size, upon the back of the print. Next lay the quarter-plates hinged with black linen, glass side down, upon the blotting-paper, and secure with the four clips, placing two at each side of the frame, so that each half of the tolding back shall be firmly held in position. The print may be examined by removing the clips from one end and raising the half, as in the case of an ordinary printing frame. For *carte-de-visite* size, a quarter-plate cut into equal parts, and for printing from whole-plate negatives, two half-plates backed with linen as above, may be used; for the larger size, eight clips will be required, in order to ensure perfect contact between the print and negative.

168.—To Print in a Background.

Employ a light background in taking the print, so that when printed it appears on a plain and slightly toned paper. The figure is then painted over with some non-actinic water-colour—gamboge, for example, so as to protect it from light in the second printing. When the colour is dry, the print is exposed behind a landscape negative, care being taken that it is not deeply printed. In washing the print prior to toning the colour is removed, leaving the paper perfectly clean.

169.—New Method of Adding Clouds to Negatives.

Many gelatine negatives have the sky so thin that, to make a satisfactory print, masking becomes necessary, and afterwards printing from a cloud negative. I have, however, recently succeeded in printing landscape and cloud at the same time, thus doing away with masking, double printing, and, at the same time, making more satisfactory work. The method by which I do so is as follows:—After the negative is finished and dry, it is coated with collodio-chloride of silver, and when dry, all except the sky is painted with a solution of iodide of potassium, which renders the collodio-chloride insensitive. I have, however, used quite successfully for this purpose a solution of hypo. A cloud transparency may now be selected, in keeping with the landscape, and printed to the necessary depth, after which the plate must be immersed in hypo in order to dissolve out the unaltered chloride of silver. After washing and drying, any minute portions standing out against the sky—such as branches and leaves of trees, rigging of vessels, &c.—may be scratched out, taking care to cut

through the collodion film only. This plan is only suitable for negatives in which the sky is somewhat thin, as it may be noticed that the darkest shadows of the clouds can only be represented by the depth the sky would print without any masking.

170.—Trimming Large Prints.

For trimming large prints or enlargements of any size up to 15 by 12, all that is required is a cutting shape of any size—say half-plate size—and a glass rule 15 ins. by about 2 ins.. It is absolutely necessary that the angles of the cutting shape are exactly right angles, and that the edges of the rule are exactly parallel. I may here mention a convenient and sufficiently accurate means of testing these requirements. Take two sheets of flat, smooth paper, and, laying one on the other, cut both round the cutting shape. Now lift the top one and replace it reversed—*i.e.*, so that the end which was towards the left may now be towards the right. If the two papers coincide exactly, the shape may be considered true. Now to proceed with the trimming of the enlargement. First lay the lower edge of the rule roughly along the foreground, then lay the cutting shape on the picture, putting one of its edges against the upper edge of the rule. Slide the shape backwards and forwards till one of its edges at right angles to the rule covers a perpendicular wall, if there are any buildings, &c., in the picture. If this edge exactly coincides with the line of the wall, you may be sure there will be no distortion, and, once more looking to see that the edges of the two glasses are in contact, proceed at once to make the cut along the lower edge of the rule. Do not lift the rule nor move it in the slightest degree, but slide the shape along the top edge of the rule till it is two inches (the *breadth* of the rule) from one of the sides of the picture. Now press down the shape and lift the rule, placing it against the edge of the shape nearest the side of the picture, and make the cut against the outside edge of the rule. Proceed in the same way for the two remaining cuts, and if your instruments are true, and if you have always kept the edges of the glasses in contact, the print must be trimmed perfectly. Never lift both glasses from the print at the same time. I always varnish my cutting shapes, as it prevents their slipping, and I always scratch lines on the varnish with a needle and a set square in both directions of the glass at intervals of about an inch. I find these lines very useful for avoiding distortion in trimming, as one is pretty sure to get one of the perpendicular lines near a building, or one of the horizontal ones near the horizon. The rule may be scratched across its length at intervals exactly equal to its breadth, to save trouble in guessing the proper distance to slide the upper glass.

171.—Reducing Over-Developed Bromide Prints.

First, make a saturated solution of chloride of lime in water, and dilute it with four to eight volumes of water; pour this solution over the thoroughly fixed and washed bromide print. By degrees the action of the chloride of lime will become perceptible upon the image. If it be too slow, add a little more of the stock solution; if too rapid, a little more water. When the proper reduction has taken place, the print is removed and washed in pure water. The chloride of lime does not injure the tone of the print, and is as effective as it is a simple method for reducing.

172.—Brown Tones on Bromide Paper.

For those who admire brown tones in bromide paper, the following formula is given by an American journal:—

A.—Neutral oxalate of potash	...	...	300 parts
Water	...	...	1,000 "
B.—Chloride of potassium	...	...	130 "
Water	...	...	1,000 "
C.—Sulphate of iron	...	...	24 "
Citric acid	...	...	2 "
Bromide of potassium	...	...	2 "
Water	...	...	500 "

After exposure, the paper, first soaked in water, is placed in a dish containing twenty parts A, five parts B, and five parts C. The more B added the warmer is the tone. The development is carried out just as usual.

173.—Restoring the Colour of Untoned Silver Prints.

Few things are more vexing to an amateur who has little time at his disposal, than the discovery that the prints made with such care ten days or a fortnight previously, when taken out to be toned, are the colour of ancient parchment in those parts which should properly be white. It has been found that if the photographs are placed immediately before toning into a bath of about one part of strong ammonia to fifty of water, washed in a similar bath after toning, and about one part of the same useful chemical be added to fifty parts of the fixing solution, when ready to mount the whites are invariably restored to their pristine purity.

174.—Blisters on Prints.

When the prints have been sufficiently long in the "washer," take any with blisters and, one by one, place them on a perfectly

clean piece of blotting-paper, partially dry it by gently pressing another piece of blotting-paper over it, then place it on a fresh piece of blotting-paper (face downwards), and again put another piece over it, and with the palm of the hand beat hard all over the paper under which the print lies; look then at it, and if all the blisters have not disappeared, repeat it. This will be found most effectual.

175.—Spotting.

This is better done after burnishing, burnt sienna mixed with a little ultramarine or Prussian blue, or rose-madder, according to the tone of the print, being used. The paints should be mixed with a little gum water to give them a glossy surface when dry, but should they show as dull spots a little encaustic cerate should be rubbed over them. Spotting in the shadows should be done with a brush fully charged with colour, but in the high lights with a brush nearly dry, and in every case with a slipping action.

176.—Spotting Medium.

Monckhoven recommends the following formula for a spotting medium:—Rouge and ivory black (in proportions suited to the tone of the print), 10 parts; saturated solution of gum-arabic, 2 parts; white honey, 2 parts; and sugarcandy, 1 part. This is applied by means of a fine sable brush held in a vertical position, as in stippling, and after the print is mounted and burnished. Water-colour of the same tint as the print will answer equally well, though sometimes there is a difficulty in getting the colour to flow; to obviate this, either use prepared oxgall, or—far simpler and equally effective—apply the tongue to the surface of the print and let the print dry, then apply the colour. The usual colours necessary will be ivory black, indigo, Vandyck brown, and crimson lake, and with these you should be able to get almost any tint.

177.—To Improve Printing Qualities of Negatives.

How much may be done to improve the printing qualities of negatives by working on the back! Take the case of a church spire projecting into the sky; the spire will often be so much denser than the foreground, that the latter becomes (in the print) a black patch before the spire is sufficiently done. In such cases, cover the back of the negative with ground-glass varnish (in extreme cases a little yellow dye may be added to the varnish), and then with a penknife remove the varnish from the spire, and from any other portion which prints too slowly. The negative

will now print much more evenly. Faces which print too dark should, on the contrary, be covered on the back of the plate with a little red or yellow transparent paint (the colours used for painting lantern slides answer well).

178.—Mounting Prints in Albums, &c.

When photographs have to be mounted in albums or in books, it is of the utmost importance that they should not cause any cockling of the boards or paper upon which they be mounted. To mount without cockling is, with a little practice, quite easy. It is of the first importance that as little water be used as possible. The prints must therefore always be mounted *dry*, and either quite flat or with the face side curling outwards. This is easily managed by rubbing the back of each photograph, placed face downwards on some soft material, say half-a-dozen folds of flannel upon a deal board, with the smoothed and carefully rounded edge of a piece of wood, about four to five inches long, about three inches wide, and a quarter of an inch or more thick; or a paper-knife would answer the purpose fairly well. The next point will be to place the photograph exactly where it is intended to be fixed, and then to make a mark at one corner, and again, once or twice, at some distance further along one of the edges. The print is then ready to be quickly brushed over with the mountant. This is best done by placing the photograph on a clean glass slab, or upon a pile of papers cut sufficiently large to place the photograph upon, so that a fresh paper can be used each time, thus saving washing the glass. The print is gently placed down at the marked corner, then manipulated carefully so as to follow the guides and to avoid, if possible, taking up the print after being once fixed in position. By paying attention to the above, there need not be the least trace of cockling on boards, and merely the slightest when mounting on paper.

179.—Useful Paste.

Place five pounds of potato starch in six pounds of water, and add one quarter pound of pure nitric acid. Keep it in a warm place, stirring frequently for forty-eight hours. Then boil the mixture until it forms a thick and translucent substance. Dilute with water, if necessary, and filter through a thick cloth. At the same time, another paste is made from sugar and gum-arabic. Dissolve five pounds gum-arabic and one pound of sugar in five pounds of water, and add one ounce of nitric acid and heat to boiling. Then mix the above with the starch paste. The resultant paste is liquid, does not mould, and dries on paper with a gloss. It may be employed for every purpose in photography except mounting silver prints.

180.—Fixing Transfers for Carbon Paper.

When freshly made, transfers, &c., are very liable to get “smudged” and spoiled. This evil may be avoided by sprinkling French chalk upon the transfer, rubbing over with the hand, and then dusting off the chalk. Transfers upon brass for *repoussé* work treated thus will even stand the process of “pitching” without being obliterated.

181.—An Iron Printing Process.

Take water	...	...	...	2 ounces
Oxalate of iron	...	...	...	53 grains
Citrate of iron	...	...	...	88 „

Make another solution :—

Water	...	...	...	2 ounces
Nitrate of silver	...	...	...	53 grains

Mix the two solutions. A precipitate falls, but the clear supernatant liquid is the sensitising solution. It may be applied to paper by brushing or floating, the excess then to be removed by blotting-paper, and the sensitised sheet exposed under a negative. When the proper depth is obtained the print is washed in several waters, and finally with a solution containing a few drops of ammonia. The print may be toned with gold.

182.—To Flatten Curled Prints.

Lay the photograph face down upon a pad composed of several sheets of paper, and place upon it at the left-hand margin a straight and rather sharp edge of a smooth ivory or boxwood rule. Move the rule slowly to the right, and with the left hand raise up the margin of the print nearest to that hand, pulling up rather strongly, yet so as not to allow the print to drag over the pad upon which it is laid. This will flatten the print and remove any further tendency to curl.

183.—A Novelty.

Paper prints mounted in optical contact with glass, known nowadays as opalines, are very effective, but a much superior effect can be produced by a thin transparency developed with hydroquinone, backed up with white paper; this gives a picture of much more brilliancy. It has also the advantage of not being so likely to fade owing to any impurity of the paper. The effect produced is exactly similar to that seen when developing a correctly exposed lantern-slide, with its white background of unaltered emulsion before fixation. The whole of the delicacy of a glass transparency is preserved.

184.—Spoiled Alpha Lantern Plates.

Don't throw away the Alpha lantern plates you imagine are spoiled by over-exposure or over-development. A greenish picture, the result of under-exposure, and a yellow or red one, resulting from over-exposure, can be made into the best of slides, by use of the usual Alpha combined toning and fixing bath. Or if the incorrect exposure is not seen until after the plate has been fixed in the usual way, you can save your failures by toning in the gold bath, just as you would an albumen print.

185.—Enamelling Prints.

Clean a glass plate well with French chalk, then coat the plate with enamel collodion. Make a warm solution of gelatine (100 grains to ounce) and float the print on it. When the collodion has set hard, place the plate in a developing dish, flow over it the solution of gelatine, and with your fingers bring the print in the solution in contact with the plate—of course on the collodionised size—take both from the solution, and squeegee into contact. When the whole is dry, fix a piece of card covered with mountant on the back of the print, let dry, and strip. The print may then be mounted with glue.

186.—How to Print a Cracked Negative.

Either put printing frame at the bottom of a narrow box, two feet deep, with blackened sides, dropping a sheet of light tissue paper over the frame; or suspend from a roasting-jack a board upon which a printing frame can rest, the roasting-jack acting all the time of printing.

187.—Oval Prints.

Take a piece of non-actinic paper, cut it into an oval size required, place this between the piece of sensitized paper and a plain glass, in the frame, and print to a dark brown, after which remove the oval, and print with the paper as usual, the effect being the same as the cut-out, except with brown border instead of white.

188.—Matt Surface to Prints on Albumenised Paper.

Mount the print in the ordinary way, but be careful to avoid any lumps. Well roll, and then sift on finely-ground pumice powder. Rub gently with palm of the hand, using circular motion. Examine from time to time. Continue operation until the proper surface is obtained.

189.—Storing Prints.

Procure a large sheet of stout cartridge paper, and make four incisions with a sharp penknife, into which insert the four corners of the print. If the sheet is large enough, a dozen prints may be fixed to it, and they will lie perfectly straight. They may then be rolled up very loosely, and placed aside until required.

190.—Removing Varnish from Prints.

Begin at the corner of the print by rubbing up the varnish with the fingers. A fine white dust will be produced, which is the dry old varnish; proceed all over the print, and wipe off this white dust with a rag. Repeat until the print has lost all the varnish.

191.—To Remove an Ink Blot.

Put on a concentrated solution of chloride of lime, or fresh prepared *eau de Javelle*. This will bleach the spot at once, but take care that the solution, after the spot has disappeared, is removed as quickly as possible with some blotting-paper, and followed by rinsing with distilled or rain water.

192.—Cleaning Spots of Grease.

Prepare a paste as follows:—Take calcined magnesia, plain collodion, and pyro-acetic spirit. It is not necessary to weigh the quantities of these ingredients exactly; it is sufficient that the paste shows the consistence of a somewhat soft salve. Take about equivalent quantities. Having mixed the paste by rubbing, put it at once, with a paper folder, on the spot. Here it remains until the volatile substances are thoroughly evaporated. The remaining powder is wiped off with a quill pen. Apply the paste again until the spot has totally disappeared. Do not use benzole for this purpose.

193.—Yellow or Fusty Photogravure.

Stick the print with drawing-pins on a board, clean it with a soft brush carefully with a solution of carbonate of ammonia, one and a half ounces in thirty-four ounces of water, then rinse the print with water, and repeat the process on the back of the print as soon as it has dried. Now wet it with water acidulated with wine-vinegar, and wash with water to which some chloride of lime has been added. Lastly, rinse once more, and dry in the sun. The print will turn perfectly white without the picture being damaged.

194.—To Make Prints Flat and Glossy.

Roll the prints in an ordinary rolling press under a thick card

mount, which has been well rolled previously to harden it. The press should be very hot, and the effect produced is nearly the same, so far as the gloss is concerned, as if the prints had been mounted.

195.—Handy Measures.

For solutions constantly required, such as hypo for fixing prints, acid solution for platinotype, &c., all the trouble of measuring large quantities may be saved by having a few large spare bottles, in which the quantities have once and for all been measured off, and scratched with a diamond upon the bottle, so that it will in future only be necessary to fill with the various liquids up to the scratches.

196.—To Sensitize Albumenized Paper.

Prepare the silver solution, sixty grains to the ounce, and be careful not to allow it to sink lower than fifty grains to the ounce; for each ounce of nitrate used, add ten drops of a saturated solution of citric acid; now add citric acid drop by drop until the slight precipitate of citrate of silver formed is just redissolved. Float from three to five minutes, and upon taking from the bath, place between sheets of clean blotting-paper, which may be used over and over again until their power of absorption is almost destroyed.

197.—To Test Gold or Silver.

Make the surface of the metal quite clean, by scraping or otherwise, and touch it with a solution of nitrate of silver. If the metal is unaffected and remains uncoloured, it may be assumed to be either gold or silver; if it blackens immediately, it proves to be brass or metal of the baser order.

198.—Removing Greasiness from Prints.

It is frequently the case that when water colours are to be applied to a print on albumenised paper, there is such a greasy, repellent action set up as to prevent this from being done. This tendency may be entirely cured by applying the tongue to the surface of the print.

199.—Russian Vignettes.

So-called Russian vignettes—that is, those in which the pictures are vignetted in a black ground instead of white, may be produced by making the exposure with a vignetting frame inside the camera; the edges of the negative will develop out as clear glass, and the resulting print will give a picture on a black background.

200.—Making Starch Paste.

In making starch for mounting prints the process should be stopped the moment the liquid clears ; if continued, much of the sticking quality will be lost. There is no better way of making it than in the little tinned copper sold with the "Pendulight," or a glue pot. Albumenised prints should be rolled up face outwards, to prevent the surface contracting.

201.—Card Mounts Adhesive.

Try mucilage of gum tragacanth, as a surface preparation.

202.—A Washing Dodge.

A good rotary motion can be given to the water in which prints are washing, by directing the feed water through an india-rubber tube against the edge of an ordinary *papier-maché* tray in an oblique direction, near an angle and pointing towards it ; the tray should be considerably larger than the prints to be washed.

203.—Mounting Prints in Optical Contact with Glass.

Apply a warm fifty-grain solution of gelatine to the face of the print, and immediately lay it face down upon the glass, applying a squeegee to ensure contact and freedom from air-bubbles.

204.—To Make Paper Waterproof.

Make a strong solution of Castile soap, and with it paint the paper or other material that is to be waterproofed. When nearly dry, paint it over again with a strong solution of chrome.

205.—To Free Silver Prints from Hypo.

After experiments with a very delicate test, which showed trace of hypo in most bought prints, it has been found that squeezing them between boards as hard as possible in a copying press four times left hardly a trace of hypo. The prints will come out of the press dry and like a mass of *papier maché*, but will separate in water. Between each squeezing they should be separated and allowed to take up as much water as they will. The whole operation is done in an hour. The greater the number of prints squeezed at once the better.

206.—To Dry Them.

Have holes a little smaller than a half-crown punched by a card seller in cardboard discs, leaving a rim about three-quarters of an inch wide. After washing spread out the prints on a table. When they begin to curl, roll them up, image outwards, and put

three of the card rings on each ; they may be heaped up to dry, or put in a basket before the fire. They will have a beautiful and natural surface, and be dry in two hours in a warm room. The above size of hole is for a $7\frac{1}{2}$ by 5 inch print rolled about its shorter side ; a larger print would require a larger hole, or it would stick and dry very slowly.

207. Reversed Negatives for Carbon Printing, &c.

Level the negative, coat with collodion, and treat as above, but taking care to reverse the film in the transfer, that the collodion side may be next the substratum upon the glass. If the negative is required as a film, the substratum must be much thicker, and the plates should be prepared in advance, as follows :—French chalk the glasses, coat with collodion, and dry. Wipe the collodion from the edges for one-eighth of an inch with a damp cloth ; level and coat with—

Coignet or hard gelatine...	...	...	5 ounces
Glycerine ...	...	...	5 drachms
Water ...	...	...	1 pint

Allow two fluid ounces for each 10 by 8 plate. Carbon transparencies may be successfully stripped by the same means, even if they have a collodion substratum. Take care to perform the operation in a cool room. The collodion and water for soaking must be warmer than the room. The dish or other vessels to contain the dilute acid must be of ebonite, gutta-percha, or lead.

208.—Finishing Bromide Prints.

The print may be mounted in the ordinary way on India-tinted boards, but a better effect with some subjects is to print them with a broad, white margin. After the mounted photograph is dry, or nearly so, take a hard, cardboard mount, a little larger than the printed part of the copy, slightly round the corners (if not so already), and carefully register in position on the face of the print, then on top of this place a smooth board or millboard ; now put all together on several thicknesses of blotting-paper in an ordinary letter-copying press, squeeze, and the thing is done.

209.—Embossing Photographs.

If you have not a press available, pass carefully once or twice through the common domestic wringing machine, of course in this case using millboard as a platen. An advantage of embossing photographs in this way is that it takes the warp and twist out of the mounts.

210.—To Print White Margins.

In a sheet of cardboard, about the same thickness as the negative glass, cut an aperture the size of the negative you wish to print from, place the negative in this opening in a large, glass-fronted printing frame, gum a strip of black paper (lantern slide binding) round the joint on film side of negative, taking care to keep it square, and the mask is complete.

211.—Platinotype Effect with Albumenised Paper.

It sometimes happens in a moment of hurry or absence of mind, when filling printing-frames with albumenized paper, a sheet is put in the wrong way. By continuing the printing in such a case, some very pleasing results can be obtained, and effects produced which, but for, perhaps, a slight grain, due to the substance of the paper, are almost equal to platinotypes. To get the best results with this system of printing, the negative must be a good one, and not in any way thin. The printing must then be carried on until all detail is out strongly on the matt-surfaced "wrong side" of the paper. It should then be washed in the usual manner, but it will be found that the shadows, as the washing progresses, will turn to a most disagreeable, greenish-yellow, muddy colour. Washing must be continued until all the heavier shadows have assumed this tint, when the picture may be toned along with other prints. In the toning bath it will lose its unpleasant colour, and assume a purplish grey, which it retains to the end.

212.—Toning Dish.

An excellent dish for toning will be found in those shallow vegetable dishes which I suppose are in every house, a stick of lead pencil placed under centre of dish making a good rocker.

213.—Vignetting.

Upon a white card should be mounted a piece of paper, say light blue; upon this again a darker colour; and lastly, a black piece of such a shape as is consistent with the vignetting mask required. The size of the copy is immaterial. A negative is then taken of it, a small stop being inserted to prolong the exposure, and during the whole of the time the camera should be racked in and out an inch or two, so producing a negative not sharp, but in which the edges of the various papers are beautifully vignettted into each other. By placing the negative so produced in proper position in the printing frame during the operation of printing, vignettes of the softest and most uniform character will be produced, even if printed in the sun.

214.—The Sand Dodge.

Make a shallow wooden box with a ground glass bottom (ground side downwards), with a rim below it to fit loosely over a printing frame. Having adjusted it over the frame, pour into it a quantity of fine sand, just enough to render the glass bottom opaque; then with the finger form an oval of the required size and shape, and give the box one or two taps to equalise the sand. When required to examine the print, lift the box off bodily. By piling up the sand on the centre of the plate, the margin may be tinted to any desired extent.

215.—Washing Prints with Little Water.

Place three dishes in a row, filled with water. Place the prints *one by one* from the fixing bath into No. 1 dish; thence into No. 2, giving each three or four turns as it is placed in, and finally into No. 3, where they may remain an hour, after which give a final rinse at the tap, and place between blotting-boards to dry.

216.—Meat Jack in Printing.

Besides rendering vignetting a comparatively easy process, it enables one to print from a cracked negative with little or no trace of the flaw, and is specially valuable when it is necessary to partially protect portions of a negative during printing. With the help of a few scraps of paper, cotton-wool, sheet lead, and a little careful manipulation, harmonious results may be obtained from inferior negatives.

217.—Mounting Prints on Paper.

The rough, untrimmed prints are first placed face downwards on a pad of felt or other soft material; the thin edge of a paper-knife is then passed over the back of each print, pressing from the centre outwards. Your prints and paper dry and flat ready to hand, have a solution of freshly-made dextrine. Take (say) a dozen of the sheets of paper, and, with a moistened sponge, damp the back of each sheet; then take up the first of the photographs, and, having pasted the back with dextrine, place on it the first of the damped sheets of paper. Now rub down smoothly, and take the next one, and so on, until you have the twelve mounted. Then take these twelve, and place separately between the two stout sheets of millboard, such as used by book-binders. Now mount twelve others in a similar manner, repeating the operation until all are mounted, and placed separately between successive layers of millboard. They are now to be left to dry, and when taken out, will be found to be perfectly flat, and will remain so. As a final operation, and in

order to give increased brilliancy and smoothness to the surface, they should now be hot-pressed, and are then ready for the binders.

218.—Handy Arrangement for Printing.

Get two pieces of board, say three feet six inches long, or whatever the width of the windows may be. They should be three-quarters of an inch thick; one must be nine inches, the other eleven inches wide. A strip of wood the same length as the boards, one and three-quarter inches wide, and three-eighths of an inch thick; a pair of stout, common hinges, with screws, and you are ready to make your printing board. Lay the pieces of board together, and screw on the hinges; nail the strip of wood on the front of the widest board, bore two holes through the narrow board, and it is ready for use. Put the whole thing outside the window on the ledge, pass stout string through the holes and fasten to anything in the room, to keep the boards from slipping out. The ledge will prevent your frames from sliding off, and the window can be closed on the board, the hinges allowing it to be shut up when not in use.

219.—A Printing Bench.

It is no light labour to hold up a 15 by 12 printing-frame in one hand, and adjust the sensitized paper on the negative with the other. It would materially lighten the labour of printers if the frames were filled lying in a horizontal position on a plate-glass bench, with nearly all light shut off except what came through the glass from below.

220.—Carbon Printing in a Nutshell.

Buy your tissue ready sensitized, place it upon the negative in an ordinary printing-frame, time the exposure in the most simple manner with the actinometer, take the exposed tissue from the frames and place it in cold water with pieces of single transfer paper, lift them out and force together with a squeegee, place between blotting boards for a few minutes—until, say, half-a-dozen pictures have been thus treated—then, beginning with the first, simply develop them in warm water. When done, a rinse in cold water stops the further action; a few minutes in a solution of alum, and a final rinse in cold water, complete the operations. But this simple and easy process does not suit negatives taken in the ordinary manner, as it inverts the image, making the left hand appear right, and *vice versa*; however, it happens that with the employment of dry plates there is a ready mode of overcoming this difficulty by simply putting the plates in the slides with the glass side towards the lens instead of the coated side.

221.—To Quickly Obtain Positive Prints.

Cut plain paper to the required size, and let it float on the surface of a solution composed of 10 grains of iodide of potassium dissolved in every $3\frac{1}{2}$ ounces of the water required for the bath. When it has remained in this solution about one minute, remove and drain; then float it for about one minute in the dark on a sensitizing bath composed of $3\frac{1}{2}$ ounces of water, 30 grains of fused nitrate of silver, and 300 grains of glacial acetic acid. Withdraw, drain, and press carefully between several folds of pure white blotting-paper; then place the paper, still slightly damp, upon the negative. The exposure in diffused light necessary in this case will only be from about five to fifteen seconds. Remove the paper from the negative, and place it on a glass plate, with the sensitized side of the paper uppermost. Then spread some of the following developing solution over it with a fine soft brush: 15 grains of gallic acid, dissolved in 35 ounces of warm water; $3\frac{1}{2}$ drams glacial acetic acid; mix and filter. As soon as the picture is sufficiently developed, place it in water to stop the action of the developing solution. Tone in a weak solution of chloride of gold, with a small quantity of carbonate of soda. Then soak for several hours in plenty of clean water.

222.—How to Sensitize Platinotype Paper at Home.

The way to proceed is to take a sheet of sized paper, sized side uppermost, lay it down on a sheet of glass which is about an inch larger than the paper each way, and fasten each corner by means of American clips. Now mix up iron solutions—one drachm of A, seven drachms of B; to this mixture add sixty grains of platinum salts, and stir it well with a glass rod till the salt is dissolved. This solution will be sufficient for sensitizing four sheets of about twenty-four by twenty inches. The solution should be used as soon as it is mixed, as it does not keep longer than twenty minutes. Take two drachms of the mixture, and pour it on to the centre of the paper which is on the glass, and spread it by means of a pad of cotton wool evenly and gently. When this is done, hang it up; take a fresh sheet and proceed in the same way with it, and so on till the four sheets are finished. Now take down the first sheet, and hold it before a bright fire till it is thoroughly dry, then the rest in their order. When the four sheets of paper are all dry, they must be kept in a tin tube containing chloride of calcium. It is now ready to use for printing. The developing solution for the paper is as follows:—

Oxalate of potash	...	...	...	130 grains
Water	...	...	...	1 ounce

This solution can be used several times. When developing, the solution is put into an enamelled iron dish, and heated to about 160° to 180° Fahr. When the developer is ready to use, take out the print which is in the frame, and pass it face downwards through the developer for about two or three seconds, and put it at once in a bath containing one ounce of hydrochloric acid to sixty ounces of water; allow to remain for ten minutes, empty the acid out, and put the fresh acid in for the same time. Repeat this operation three times, and after that give a final washing.

223.—Black Process.

In the first place, procure a piece of well-sized paper, and sensitize it with the following preparation:—

Gelatine	...	...	...	...	1 part
Perchloride of iron	...	...	...	...	2 parts
Tartaric acid	...	...	...	...	1 part
Persulphate of iron	...	...	...	...	1 „
Water	...	...	...	...	30 parts

Place a piece of the sensitized paper in contact with a negative in a printing-frame, when the result will be, when printed and developed, another negative print. Next procure a transparency, treating this in a similar manner to the negative, the result being a fine positive print; but everything is reversed. The more the copy is printed, the fainter will be the impression; therefore, to obtain good results, correct exposure must be given. Development is effected in the following manner:—

Gallic acid	...	...	...	...	1 part
Water	...	...	...	...	160 parts

When dissolved, immerse the print, and let it remain in developing solution until all detail is out; then wash in clean water for a few minutes; finally, hang up to dry, or dry between blotting-paper. The picture thus produced is, when finished, a fine purple black.

224.—Gelatine Glass Positives.

The film of emulsion should be extremely thin, and very short exposure should be given. The development ought to be with ferrous-oxalate developer to which a liberal addition of potassium bromide has been made. After a thorough rinsing with water, the plates are fixed with a potassium cyanide solution containing one part of the salt dissolved in twenty parts of water. Thorough washing is now required, after which the plate is immersed in a weak solution of mercuric chloride (corrosive sublimate) until the image is thoroughly whitened. Again wash, soak in methylated spirit to remove water from the film, and dry at a gentle heat.

225.—Transferotypes.

A sheet of the transferotype paper having been exposed to light under a negative, is developed. If it is ultimately intended for, say, an opal picture, then the development is carried no further than is shown on its surface, as being a good picture, pure in the whites and perfect in the details. But if it be intended for a lantern or stereoscopic transparency, then is the development carried a little further—so far, indeed, as to obliterate the details in a larger degree, leaving only the very highest lights immaculate. At this stage the development is arrested and the photograph is fixed, washed, and held in readiness for transferring. If for an opal picture, the development, as stated, is such as to show a good image on the paper. In either case, whether for opal or transparency requirement, the paper containing the picture, after having been fixed and washed, is laid down upon and squeegeed into contact with its future receptacle. By developing with pyrogallic acid, a pleasant dark brown tone is obtained, but the best results are obtainable by the ferrous oxalate developer; a solution of four parts of neutral potassium oxalate with one part of ferrous sulphate, both in saturated solutions, being employed. After being blotted and allowed to become surface dry, the plate, with its adhering paper, is placed in a flat tray of warm water, when, after about a minute, the paper may be stripped off, leaving the image adhering to the glass. It will have been divined that the transferotype paper, previous to having been coated with the sensitive emulsion, has received a substratum coating of gelatine of a highly soluble nature, while the emulsion gelatine is soluble in a much less degree. The water in the stripping bath must only be warm enough to dissolve the substratum.

226.—Use of Clothes-Wringing Machine.

Lay each print direct from the fixing bath on a piece of plate-glass, and pass the same through a clothes-wringing machine with Indian rubber rollers, then wash the prints in several changes of water for an hour, and again pass them through a machine; another hour's washing, and they are finished. Pass them a third time through, but merely for facilitating the drying process. Care must be taken that the print in passing through the machine does not leave the glass by clinging to the upper roller.

227.—Cloud-Printing.

When clouds are to be printed into a landscape the negative of which is cloudless, the first thing to consider is the direction of the light in each negative in the combination. A print of the landscape is made upon albumen paper, and then carefully cut

at the sky-line of the print. That portion of the print which covers the landscape section of the negative is now fixed to the cloud negative the albumen side to the film, and when exactly in position is fastened with mucilage in two places at the lower corners. If a little of the landscape part is cut away, when used as a mask, it will allow the cloud negative to overlap the landscape portion in the printing. Having arranged the cloud negative with its mask, make a print in the ordinary way from the landscape negative, which gives a white sky in printing. When the necessary details are out in the landscape, remove the print from the negative and place it under the cloud negative, very carefully adjusting the sky-line to overlap (just a little) the landscape. In printing, shade the horizon a little in order to produce a lighter impression at that point in the print.

228.—Masking Out.

Taking the case of a single figure, a print is made from the negative containing it, and the figure is carefully cut out with a sharp penknife in such a way that both the figure and the surrounding part of the print are carefully preserved and will fit each other. In this way two masks are obtained—the figure, to use with the landscape into which it is to be printed; and the surroundings, to be used to cut out all but the figure in the negative from which it is printed. The figure (with its masked surroundings) is printed first, and then the landscape negative (with its figure mask) is adjusted to make the composition. Great care is necessary to make the masks register neatly, and if there are any defects in this regard they can usually be remedied by retouching the prints with Indian ink.

229.—Quick Proofs.

Eastman's "A" Permanent Bromide Paper may be employed for making proofs from negatives as soon as developed, without waiting to dry them, in the following manner:—Wet a piece of the "A" paper and squeegee its face down on to the negative as soon as the latter is fixed and washed; wipe the water off from the back of the negative, and expose it to the light of a lamp or match for a few seconds; lift the paper off from the negative, and develop it with the oxalate developer as directed; fix, rinse, and it is ready to show the customer whilst wet.

230.—Drying Quick Proofs.

Proofs may be squeegeed face down on to a polished sheet of hard rubber and allowed to dry. They can then be peeled off the rubber, and will have a fine *glacé* surface. By adopting this method the operator can save from twelve to twenty-four hours

in proofing his negatives. Paper negatives may be proofed or printed in the same way by laying the wet negative back down on a piece of glass and squeegeeing on to it the piece of "A" paper, which has previously been soaked in water. In all cases the negative must have been thoroughly washed.

231.—A New Printing Process.

The paper is first coated upon both sides with a starch solution. The sensitising solution is prepared from the following formula :—Potassium bichromate, two parts; mercuric chloride, one part. For the bath, take pure water, and to each ounce add fifty grains of the above-mentioned compound, and thoroughly dissolve the same. The paper is immersed in the bath so as to wet both sides of it for a period not exceeding one minute. The paper is dried by artificial heat, and should be used the same day. After the paper has been dried, it is printed upon by exposure to light under a negative. After washing the prints in clear water, they are subjected to a developing bath of pyrogallol, two parts; gallic acid, eight parts; ferrous sulphate (dried), or other ferrous salt soluble in water, ten parts; sodium hyposulphite (dried), eighty parts, dissolving the compound in water in the proportion of two per cent. of the compound to the water. The print should be left in the developing bath from five to ten minutes, and then removed and washed in clear water. It may then be bleached by the action of a dilute solution of chlorine or bromine. The chlorine bath is best prepared by dissolving one part of calcium-hypochlorite in three hundred parts of water, and adding about two parts of an acid, preferably phosphoric acid. After the prints have been bleached, they may be mounted in the usual manner.

232.—Printing on Wood.

Take one drachm of dried albumen, and dissolve in two drachms of water (tap water will do), and when dissolved filter through fine muslin, and then add enough of a 60-grain solution of nitrate of silver to coagulate nearly the whole of the albumen, after which place in a Wedgwood ware mortar, and grind until quite smooth. At this stage a little of any kind of chloride may be added if desired, but I have not found it to be required in practice; or a little very fine zinc white may be added. This also is a matter of taste, and is not really required. To coat the block, first whiten as for drawing upon, and when dry, spread a very little of the albuminate of silver over the surface of the block with a stiff brush, and then smooth with a badger hair brush or softener; dry by gentle heat. Print about as deep as on albumen paper, and tone and fix as usual. In

working the above it is best to soak the albumen over-night, and stir well before filtering through the muslin, and, before coating the blocks, to damp them slightly on the back, especially if large, as this tends to prevent the block from being curved on the face. In toning and fixing, it is well to support the block so that the surface only is in contact with the solutions, and to wash, after fixing, in the same way, very little washing being required.

233.—Burnishing.

Keep the tool and roller always clean. See that the tool is sufficiently heated, or a few lines may appear on the surface of the prints. Lines on the surface of a print may be removed by lubricating again, allowing to dry, and reburnishing, provided in all cases that the face of the tool is clean.

234.—To Block Out Skies.

The quickest and most satisfactory way is to obtain a paraffin lamp and turn the lighted wick up till it smokes, then hold the negative over glass side (not the film) till the sky is blackened with the smoke. It is as well to let the smoke go over part of the subject as well as the sky. The negative is then held up to the light, and the parts not required to be opaque can be cleaned off with a duster.

235.—Removing Spots on Prints.

Mix together two parts commercial solution of sodium hypochlorite with one part saturated solution of alum, and filter through two thicknesses of filter paper. The filtered solution is applied with a large camel hair brush (mop) to the mark to be removed, care being taken not to allow the liquid to run on to the image, which it is not desired to remove, though, should this inadvertently happen, the print may be rinsed and developer applied to the place, which will bring up the image again. In a short time the mark disappears, and on rinsing in water and immersion in "hypo," is gone.

236.—Printing Irregular Negatives.

If your negative has a weak foreground and intense distance, expose the printing-frame placed obliquely in a box, so that the most light may fall on the part of your negative which is densest, and the least light on the weakest part sheltered by the side of the box.

237.—Painting out Skies in Weak or Defective Negatives.

With the aid of a hand magnifying-glass go carefully over the outline on the varnished film, using Indian ink and a soft but

finely-pointed quill pen. Fill up the rest of the sky with black varnish, or non-actinic paper. Then, on the plain side of the glass, follow the outline with a brush dipped in ink, taking care just to overlap the line on the film side. Print with the aid of a meat-jack, or some other appliance for keeping the frame rotating.

238.—Printing from Hard Negatives.

Before putting the paper in the frame, expose it for a moment to a white light, till it takes a very light colour. This will, to a considerable extent, get rid of the chalkiness in the print. If there are any portions especially dense, detail may be obtained in them by the use of a large burning glass when the frame is first exposed.

239.—Improved Printing Frame.

Take a five-eighth centre-bit, and bore down to the bottom of the rabbet within one-sixteenth, and cut out the half of the hole nearest to the rabbet, which form a D-like slot, each facing the other. Into this *fit* a piece of wood slightly thicker than the depth of the rabbet; to this piece of wood, or bar, screw the hinges, and make the three pieces, when put together, the same length and width as the doors in the ordinary printing frame, with this difference—the middle bar has to project as much as is required to fit into the frame. The bar is fixed by two small thumbscrews; and when the negative and paper are in the frame, the thumbscrews hold both fast. The three pieces are covered with one piece of cloth, and cut across so as to form one level piece to fit on the negative.

240.—A Print Sinker

Is a useful device consisting of a strip of lead or type metal with a goove on one side, and flattened on the other, so as to lie with the grooved side up, the object being to hold prints in an upright position during washing, and so materially facilitate that operation. Of course a sinker is required for each print, the edge of the print being placed in the groove, and fastened there by one or two small wooden wedges.

241.—An Actinometer.

A very good actinometer can be made from a strip of bromide paper and an empty match box—the French or Italian paper-box sold for a halfpenny. Double the last match over the end of the strip of paper, and roll it up as thick as the box will carry, let the draw fly back, leaving the end of the paper projected, to be drawn out as required. The test colour is placed on the top of the box.

242.—Trimming.

Use a good stout sheet of glass and have the cutting glasses nice and clean and quite free from damp, such as finger-marks, &c. A good cutting-knife may be found in the stump of an old onion-knife. When going to trim a batch of prints, have always at hand a flat piece of sandstone, on which sharpen the blade at intervals during the operation. Trim before toning.

243.—Mounting.

Get two clean towels, spread one of them out on the table, over which place the prints in rows. When this is done take the other towel and lay over the prints. In a short time all superabundant moisture will be absorbed by the towels, and the prints will be nice and limp. Now gather them up into a pack, face downwards, and lay them on the towel in a heap, like a pack of cards. They are now ready for being brushed with the mountant.

244.—Silver from Trimmings of Untoned Prints.

Procure an old iron bucket or pot, and place the cuttings in, a few handfuls at a time, and apply a light to them, when they will quickly burn to ashes. As they burn down, keep adding the cuttings, which must be stirred up frequently with an iron rod, so as to completely reduce all the mass to fine ashes. Of course the burning must be done out of doors, owing to the dense smoke and disagreeable fumes. If in windy weather, place a piece of sheet iron partly over the bucket to prevent the ashes from blowing away. The fire will be a long time dying out. After the trimmings are reduced to ashes, the ashes can then be reduced to metallic silver in a crucible with equal quantities of carbonate of soda and borax, or sent away to be reduced.

245.—Washing Prints.

Have a watering can holding about half a gallon of water, and after dipping the prints into water, place them in the can and hang on tap over sink, tilting so that waste water may run off through the spout, leaving tap turned on, so that the can is always full of clean water. In a very short time they will be found ready for toning, and after fixing the same process will clear away the hypo.

246.—The Solar Camera.

This is a copying camera with a condensing lens to concentrate the sun's light on the negative, so as to allow the focus of the lens to be at a considerable distance, to obtain an enlargement of a picture. The magnified image of the transparent negative may

be received upon either sensitised glass or paper. For use with ordinary albumenized paper, sensitise it in the usual way ; the development required will, however, be longer. Or thin Saxony paper may be used, after being floated for one minute on the following solution :—Chloride of ammonium and citric acid, 4 drams each ; 25 oz. of distilled water, saturated with sesquicarbonate of soda. To prepare this bath, dissolve the citric acid in part of the water, and add the soda until the acid is neutralized ; add the resulting citrate of soda to the solution of chloride of ammonium ; add a little citric acid in solution, with a small quantity of boiled arrowroot. Remove the paper from this bath, and hang to dry.

247.—White Titles on Views.

Cut paper to size before printing if possible, but in any case cut the bottom edge straight, and then with a pen charged with well mixed Indian ink, or opaque water colour, write the name of the view where wished to appear, and allow to dry before placing on negative. The ink is easily removed with a wet sponge before toning, leaving the title in white characters on the print. Use a smooth pen, opaque ink.

248.—Lightening Dark Prints.

For lightening silver prints that have printed a little too dark, a good plan is a continued immersion in the hypo bath. With prints that have been somewhat over-printed, leave in the hyposulphite solution for a period of from half an hour to two or three hours, according to the amount of reduction required.

249.—Preserving Paper while Printing.

After placing the paper in position on the negative, lay an old piece of sensitised paper over it before putting on the pad, and should the print be in the frame several days, owing to wet weather, slow printing negative, or other causes, it will come off almost as good as on the day the paper was floated. Any old print, untuned, will answer, whether on ready-sensitised or home-prepared paper.

250.—Coloured Pictures.

A landscape negative is chosen, and slightly printed from on a sheet of albumenised paper, so as to have a slight image. Naturally the print is fixed and well washed. When dry, this print is coloured according to the taste of the artist ; the colouration is left as brilliant as possible. A film positive is now printed from the negative, and is made to adhere to the coloured print. The two combined make a very artistic picture.

251.—Test Papers

Are prepared by uniformly wetting sheets of unsized paper in solutions of litmus, buckthorn berries, Brazil wood, or other particular colouring matter required.

252.—Lithographic Transfer Paper.

Make strong separate solutions in hot water of gum arabic 2 parts, by weight; starch, 6; alum, 1. Mix, and whilst moderately hot, give the paper two or three coats with a brush, allowing each coat to dry before the next is applied; finish by pressing.

253.—An Aniline Black Printing Process.

The paper intended for use in this process should be well sized with an aqueous solution of gelatine in the proportion of one to fifty. The sensitising solution consists of:—

Chloride of sodium	...	...	...	48 grammes
Bichromate of potash	...	...	...	48 "
Vanadate of soda	...	...	...	0 gr. 10.
Distilled water	...	...	...	960 c.c.

Another solution is made of:—

Sulphuric acid	...	...	...	96 c.c.
Water	...	...	...	480 "

When this is cold, it is added to the first solution; the paper is floated upon the mixture, and allowed to dry in a dark place. The paper, when dry, or while slightly damp, is then exposed under a printing frame for about seven minutes to the action of light, after which it is kept in the dark until it is desired to develop the image. It is then exposed for one minute to a mixture of the vapours of water and aniline; next it is placed in an atmosphere of vapour of water kept at a temperature of from 24° C. to 30° C. The image is thus developed in black lines upon a green ground. To remove the green colour, it suffices to soak the paper in a one to six solution of ammonia. The print has then to be dried and pressed.

254.—Silver Printing on Plain Paper.

Select a smooth, hard-sized wove, not laid, sample of paper, which is to be salted by sponging or brushing it over with a solution of chloride of sodium (common salt), six grains to the ounce of water, and then suspending it to dry. To sensitise the paper, float it for two minutes upon a bath of ammonio-nitrate of silver, made by dissolving fifty grains of nitrate of silver in an ounce of water, and then adding to it strong ammonia drop by drop. The effect of this addition is to cause a dirty-looking dark brown precipitate to be formed in the previously clear liquid,

and the ammonia must be slowly added until indications appear that the liquid is beginning to become clear. Now stop and shake or stir the solution to mix the ammonia with it, when, if not yet clear, add more, but only by a single drop at a time, followed by stirring or shaking after each drop. Cease adding ammonia after the solution has become almost clear, for it is better that this stage be not quite reached than that there be an excess of ammonia. If the mark should have been overshot, a little more solution of nitrate of silver must be added. The paper having been dried is ready for exposure. Toning and fixing may be done as with ordinary albumenised paper.

255.—Retouching Dodge.

When the retoucher has a harsh negative, with dense high lights and empty shadows, one of his dodges is to affix a sheet of *papier minérale* on to the glass side of the negative. This serves a double purpose. First he will work out the dense lights with a dabber charged with vaseline or Canada balsam (thinned, perhaps, with benzole). This renders the *papier*, on the lights where applied, transparent, while the shadows remain protected by the ungreased portions of the *papier*. Secondly, the detail in these, dark shadows may be further helped by working with stump and blacklead, or a soft lead pencil.

256.—Alternative Method.

If the negative be of opposite character—viz., weak and flat and lacking contrast—the *modus operandi* is reversed. Here we pick out the shadows with the vaseline, and strengthen the high lights by means of the blacklead.

257.—Blisters.

Keep a small quantity of undissolved camphor in the sensitising solution, which must be kept up to its fullest strength, and see that the paper is stored in a perfectly cool room both before and after exciting, drying it as quickly as possible after the latter operation. Let the washings be expeditiously performed, especially the first two or three changes; do not wait to see how milky the water will become. Let the last wash have as much salt in it as will give the water a fairly good taste of its quality, finally changing into fresh water ready for toning. Reserve this saline solution, into which transfer the prints from the toning bath; and let the toning, and indeed all other operations, be as speedily executed as possible. Do not make the hypo bath stronger than two ounces to the pint of water, and put in it a handful of salt, and one or two drachms of liq. ammonia. When the fixing is complete, put the prints one by one into another solution of salt, turning them over for five or ten minutes, and

then into a moderately weak solution of alum, finally transferring them to the washing trough.

258.—Utilizing Over-Printed Proofs.

Employ the paper print as a transparency, rendering it translucent by waxing or other means. All that is required is a good deep print, and the toning not carried too far.

259.—The Pockethandkerchief Dodge.

Say you have by you a negative of a bay, a black fishing-boat in the immediate foreground, and mountains in the distance. Without dodging, this gives an absolutely black boat, where all detail and half-tone is obliterated and sacrificed to the distance; but by covering the foreground and boat with a handkerchief when half printed, a harmonious picture may be obtained where the half-tones of the foreground are preserved, and, at the same time, the distant mountains are fully printed.

260.—The Tissue Paper and Stumping Dodge.

Suppose we have a group where, owing to a too rapid exposure, or a developer too strong in bromide, the faces are abnormally dense, and the shadows very thin and destitute of sufficiently vigorous half-tone, and we cannot take another negative. Edge a sheet of good tissue or tracing paper with gum, and fasten it on the back of the negative; then either render the dense highlights more transparent with gum-water or oil, or stump over the shadows with black-lead, or preferably, rub them with a stick of charcoal; this can be more evenly applied, and "bites" well on the paper; or we can apply either gamboge or Prussian blue with a brush to the thin parts. By this simple means a presentable print may be got.

261.—To Glaze Albumen Prints without Apparatus.

Thoroughly clean a sheet of common glass, of size to hold several prints, and see that it is free from scratches, &c.; then dust it liberally with powdered French chalk, and with a soft pad rub the chalk all over and into the surface of the glass. Do not polish off the chalk, but after rubbing in dust off the loose chalk with a soft brush or dry handkerchief. The glass is now ready. Next take the prints direct from the washing water (they must not be drained or dried in any way since fixing), and place them face downwards on the prepared surface of the glass; cover with several folds of blotting-paper, and over all a piece of stout paper, and rub well down with the palm of the hand until the prints are thoroughly in contact with the glass and all air specks expelled, care being taken that the prints do not move on

the glass during this operation. The glass is now placed with the backs of the prints upwards before a bright fire, on the top of a stove as hot as the hand will bear, or, in summer, in a window exposed to hot sunshine, and, as soon as dry, the prints will leave the glass, and be found to possess a very fine surface.

262.—Skies in Enlargements.

First procure a suitable sky negative of the same dimensions as the one to be enlarged from ; then carefully pencil on a piece of black paper the exact outline of the trees or housetops in the negative. Having cut out this mask of the lower portion of the picture, lightly gum it on to the plain side of the sky negative so as to effectually block out all portions except those clouds that it is wished should appear in the enlargement. The sky negative having been thus prepared, place it in the carrier, and expose, for example, say, thirty seconds, then place the cap on the lens, remove the sky negative from the carrier, and replace by the proper negative, exposing this five times as long, the development and subsequent operations being precisely the same as usual.

263.—Adjusting Prints in Frames.

Hold a cabinet glass cutting shape in front of the negative, and shift it about till the best position is obtained ; then make a good thick pencil mark all round the shape. For those who use half-plate paper this is, of course, unnecessary, but the advantage of using cut paper is very great.

264.—Mounting Medium, A Good.

Procure half an ounce of the finest white gum-arabic and carefully pound this to a very fine powder in a mortar, then mix with it about three times its bulk of dextrine, adding about a couple of ounces of water so as to form a thick, smooth paste ; finally dilute it with five ounces more water, and then boil by means of a water bath for fifteen minutes, stirring it continually all the time. It may then be poured into a wide-mouthed bottle, and after the addition of five drops of ammonia is ready for use. A stiff brush inserted in the cork will add to its usefulness.

265.—Alpha Paper.

To get coral tones on alpha paper, expose to the gas flame of a No. 3 Bray burner, at about six inches off, for from four to five minutes. Remove wet, and develop with a developer, approximately :—

Potassium oxalate, sat. sol.	...	...	52 minims
Ferrous sulphate	"	...	7 "
Potassium bromide	"	...	3 "
Water ... ..	...	...	360 "

Arrest development before the print is quite up, and fix as usual.

266.—Blisters.

An excellent dodge for preventing the appearance of these unwelcome visitors is that of mixing a little powdered borax with the hypo bath. It never fails.

267.—Extemporizing Bromide Paper.

When your stock of bromide paper has unexpectedly run short, try the following:—Float a sheet of ordinary sensitised paper for two minutes on a bath composed of—

Bromide of potassium	...	...	...	1 ounce
Water	...	...	...	1 quart

Dry in the dark, and manipulate precisely the same as with bromide paper.

268.—Cheap Lubricant for Burnishing.

A mixture of equal parts of linseed oil, liquor ammonia, and water, produces a lubricant that equals Castile soap for burnishing, and is not so expensive.

269.—Cutting Sensitized Paper.

Lay an old newspaper upon a table, on which place, say, six sheets of sensitised paper; then, with cutting shapes the required size, cut through the whole six at once. This saves time by obviating the necessity of having to trim every print separately before toning.

270.—Combined Fixing and Toning Bath.

The following formula is a great time-saver, and the tones can be varied from red to black. Dissolve 60 grains tungstate of soda, 100 grains sulphocyanide of ammonium, and 960 grains hyposulphite of soda in 6 ounces water; when perfectly dissolved add 6 grains chloride of gold, and shake the whole well together. This bath is sufficient for four sheets of paper.

271.—Green Pictures.

These may be obtained by immersing an ordinary cyanotype print in a solution of 1 drachm sulphuric acid to 16 ounces water. (*See Iron Prints.*)

272.—Iron Prints.

These are also known by the names of cyanotype, ferro-prussiate, and blue prints, and are exceedingly simple to make. Float any unglazed paper on a bath composed of—

No. 1.—Ammonio-citrate of iron	...	...	2 ounces
Water	...	...	8 "

No. 2.—Ferricyanide of potassium ...	2 ounces
Water	8 „

Mix Nos. 1 and 2 in equal proportions. Print till the high lights turn a metallic grey colour, then wash in three changes of water.

273.—Iron Prints, To Tone.

These prints may be changed from blue to brown by immersing for five minutes in a solution of tannin 1 dram, water 4 ounces, afterwards transferring to carbonate of soda 1 dram, water 5 ounces, changing them back to the tannin solution (with intermediate washing) after remaining about a minute.

274.—Keeping Sensitised Paper White.

After placing the paper in position on the negative, lay an old piece of sensitized paper over it before putting on the pad, and should the print have to remain in the frame for several days owing to wet weather, &c., it will come off as good as when it was floated.

275.—Lead Toning.

Good tones may be obtained on silver prints by the following bath :—

Acetate of lead	$\frac{1}{2}$ ounce
Hypo	4 ounces
Water	1 pint

Of course this fixes as well, and for that reason is both cheap and quick.

276.—Opals.

Splendid opals may be made by printing on Eastman's Trans-ferrotype paper, and transferring to opal glass. The process is much easier than in the regular way, and the result equally as good.

277.—Opalines.

These are made by printing the same size as the plate, but with a vignettted margin, then mounting in optical contact with a plate of bevelled edged glass, backing up with black or fancy coloured cardboard.

278.—Restpring Discoloured Prints.

In order to restore to their original purity untuned prints that have become discoloured through long keeping, place just before toning into a bath of about one part strong ammonia to fifty parts water. Wash in a similar bath after toning, and add a little ammonia to the fixing bath.

279.—Rich Purple Tone, To Obtain a.

The following formula is an admirable one for producing the velvety purple so admired by some :—

Borax	...	...	...	...	...	...	1 ounce
Gold	...	...	...	...	...	...	1 grain
Water	...	...	...	...	...	...	8 ounces

Use warm.

280.—Blocking-out Skies.

Hold the negative glass side down over the fumes of a paraffin lamp till it is smoked quite black. Then, with the corner of a soft rag, carefully wipe away all except the sky portion, and it is ready for printing.



PART IV.—Lantern Dodges.

281.—Substitute for Condensers.

A simple and inexpensive condenser may be made in this manner. Procure a concave glass of about thirteen inches diameter, such as is used for dial clocks; and have a sheet of glass cut to fit it; join these together with optician's cement and a few brass clips; leave a small hole at the top for filling, and at which form a small funnel of the cement. Fill carefully with pure glycerine, and you have a large plano-convex lens of about thirty inches focus. Two such would make a fair condenser at a cost of less than five shillings.

282.—Lantern Slides by the Wet Process.

Thoroughly clean a piece of thin glass, coat it with a ripe sample of collodion bromo-iodized as usual, and plunge it into a holder containing a solution of silver nitrate of the strength of thirty-five grains to the ounce of water to a pint of which one grain of potassium iodide in half-an-ounce of water is added; stand the liquid in the sun for a day, filter, and slightly acidify with a minim of nitric acid. After an immersion of two or three minutes, the plate is ready for the camera. Its exposure should be a full one, and its development effected in a solution of protosulphate of iron ten grains, and glacial acetic acid ten minims per ounce of water; the plate is then to be only slightly rinsed, and immediately fixed in hypo of the usual strength, and thoroughly washed.

283.—Vignetting Enlargements.

To make a vignette picture, the operator, standing at the left, and half facing easel, should screen the lens with a piece of cardboard about 16 by 20 inches. A hole of the proper shape for the vignette is cut in the centre. Having uncapped the lens, the vignetter should be moved back and forth from the lens to the easel. Continue this movement through the entire exposure. Additional time can be given on any part of the image that may need it, by cutting a smaller hole in the same size cardboard, and proceeding about the same as when vignetting.

284.—Vignetting Landscapes.

On landscapes, extra time may be given on the sky by shading the balance of image with a piece of cardboard of the proper shape; the most beautiful sky effects can be produced in this way.

285.—Moonlight Effect.

A charming moonlight effect may be temporarily imparted to a picture on the screen by inserting in front of the slide a piece of greenish-blue glass, or by holding it in front of the objective.

286.—Cutting Glass.

Most know the bother in getting hold of a cutting-glass and placing it in position. Well, then, stick an empty thread bobbin or a cork on the glass with elastic cement, and the trouble will vanish. Only use the knife when cutting.

287.—Making Lantern Slides from Larger Negatives.

Get a box measuring $10\frac{3}{4}$ by $8\frac{1}{4}$, and 3 inches deep. Take off the lid, and in its place fix a sheet of ground glass 10 by 8, by putting runners at top and bottom (it might be made fast by simply pasting paper round the edges). Then cut out a piece, 8 by 6, of the bottom of the box, and fix grooving at top and bottom outside for the negative to be slipped in and out easily. Use it in the following manner: Fix the camera by the tripod screw on to a board broad enough to support it, about fifty inches long, and raise on two supports about three inches (so that the screw is easily got at), and place the negative holder at the other end with the negative, film side facing lens. Place on a table facing window, so that the light will pass through the ground glass to the negative, and find correct position by focussing with full aperture, and then stop well down; place two laths from top of camera to top of negative holder, and throw a double thickness of black silesia over, so as to make a dark tunnel. Cut a carrier out of a wooden cigar box to fit the half-plate carrier and size of lantern plate, making the corner pieces of stout bent pins with the heads cut off.

288.—Clear Whites in Enlargements.

After development, before any attempt is made to wash off any of the developer with water, the print is well washed with a solution of citric or acetic acid and alum. Of course the developer is previously drained from the print. By thus thoroughly acidifying the paper before it comes into contact with any washing water, perfect purity is maintained in the whites after washing and drying. Wash thoroughly before fixing.

289.—To Prepare an Illustration for the Lantern.

A lecturer may prepare a diagram in a few minutes by coating thin glass or mica with benzole varnish to which a few drops of india-rubber solution has been added. This dries transparent, but allows of the finest writing being made on it by means of a steel pen and India ink. By placing it upon an engraving the leading features may be quickly and accurately traced in outline.

290.—To Cut Lantern-Slide Masks.

Make a form the shape required from sheet tin or brass, and bend it in the middle till the two edges meet. To use it, place the paper, doubled, between the leaves of the form, and cut around it with a pair of scissors.

291.—Marking Lantern Slides.

This can be most easily done by placing a piece of white paper (whether square, oval, or round it matters not) on the right top corner of the slide, and to appear there at the very moment the slide is inserted in the carrier of the lantern. To arrange this systematically it is only necessary that the slide should be laid on the table, with that face uppermost which is to go next the condenser, and with the sky (or top) at the bottom and the foreground at the top—in other words, the slide laying upside down. When in this position, which is the way it goes into the lantern, attach a piece of white paper on the top right corner, on which should be marked a number, and this should go on consecutively from No. 1 for each maker's slides. Again, whilst the slide still lays in this position on the table, the top left corner may have, on a similar piece of white paper attached, the name of the producer, and then on the black paper which appears on the glass between the number and the name; and to this paper, at a fixed distance from the edge (with sufficient width), may be attached titles, so that either when arranging the slides preparatory for exhibition, or at the actual moment of placing them in the lantern, it should be distinctly understood and accepted that whilst the slide is so held all the information upon it can be seen and read.

292.—Enlarging on Canvas.

Instead of transferring an enlarged photograph to the canvas upon which a painter has to work, it is now becoming the custom for the painter to set up his prepared canvas in the enlarging room, and to have an image of the desired size projected upon it from a small negative. The painter then, guided by this image, traces in the required outlines with charcoal, but is left at liberty

to make any alterations he may desire, and to omit any objectionable details or accessories.

293.—To Draw on Glass.

Grind lamp-black with gum-water and some common salt; draw the design with a pen or hair pencil; or use a crayon made for the purpose.

294.—Stencilling or Writing on Glass.

Stencil plates may be cut out of thin sheets of metal or cardboard, in the same manner as for wall decoration, &c. If varnish colours are employed, lay them on as evenly as possible, through the perforations in the plate, and harden afterwards in a stove or oven. The metallic preparations used in glass staining and painting are also available, but require firing in a muffle, or a china painter's stove. Should the process commonly called embossing be wanted, paint the portions of glass left uncovered by the spaces in the stencil plate with Brunswick black, dip or cover with hydrofluoric acid, wash in clear water, and remove the black ground. Every part that was covered will then present a polished even surface; the remainder will have been eaten into by the acid. If the raised parts are to have a frosted appearance, rub them with a flat piece of marble moistened with fine emery and water. For putting patterns or lines on glass with a wheel, there are two methods, one followed by glass cutters, the other by the engravers on glass. The first-mentioned, rough in the pattern, with an iron mill supplied with a trickling stream of sand and water, smooth out the rough marks on a wheel of York or Warrington stone, polish on a wooden wheel of willow or alder moistened with pumice powder, and finish on a cork wheel with putty and rottenstone. The engraver cuts in and roughs the pattern with copper wheels, aided by emery of various degrees of fineness, and olive or sperm oil, and polishes the portions intended with leaden discs and very fine pumice powder and water.

295.—Painting Glass for the Magic Lantern.

Draw on paper the size of the glass the subject you mean to paint. Fasten this at each end of the glass with paste or cement, to prevent it from slipping. Then reverse the glass so as to have the paper underneath, and with some very black paint, mixed with varnish, draw with a fine camel-hair pencil very lightly the outlines sketched on the paper which are reflected on the glass. It would add to the natural resemblance if the outlines were drawn with a strong tint of each of the natural colours of the object; but in this respect the artist must please his fancy.

When the outlines are dry, colour and shade the figures; but observe to temper the colours with strong white varnish.

296.—Pigments for Magic Lantern Slides.

The only pigments available are the transparent and a few of the semi-transparent. The transparent include (beginning with the best for the purpose) Prussian blue, gamboge, carmine, verdigris, madder brown, indigo, crimson lake, and ivory black. The semi-transparent include raw sienna, burnt sienna, cappah brown, and Vandyke brown. No particular method of mixing the colours is requisite. Ordinary oil or water colours will do, but they must be ground extremely fine. The pencils must be small and their points unexceptionable. Camel's hair is preferable to sable for painting upon glass, its elasticity being less, and the trouble of working out the brush marks, which must always be carefully attended to, not so great. The best vehicle to use for thinning the colours is ordinary megilp, and not a drop more than is necessary for properly working should be added, for if the colours be made too thin they will run into each other and utterly ruin the painting.

297.—Lantern Copies.

Engravings, pictures, book illustrations, diagrams, &c., can be made into good lantern slides with great ease. To insure success, one or two points should be noticed. First of all, to obtain the negative, the best sort of light is magnesium ribbon; eight inches give about the right exposure, burnt in two lengths, four inches on each side, behind the lens and about two feet distant from the object, using an aperture of $f/12$. Secondly, by far the best results are obtained by carefully avoiding over-exposure, and by stopping the development before there is any danger of the shadows being veiled; in fact, slightly under-exposing and under-developing. Then intensify with mercury. The resulting lantern slide, if a bromide plate, is best developed with pyrogallie acid and carbonate of soda. For copying coloured plates and pictures, an isochromatic plate should be used, and the instructions given with it carefully followed.

298.—Transparencies.

Very beautiful window transparencies may be made by printing on Eastman's transferotype paper, and transferring to the smooth side of ground glass. Their beauty may be considerably enhanced by colouring the back of the film.

299.—Iron Transparency.

Clean a spoiled dry plate thoroughly, and coat with a solution of gelatine about one to thirty. When dry flow with the ferri-

prussiate solution used for making blue prints, and set up to drain. After thoroughly drying, place behind a negative and print as usual. Wash with plain water, and dry.

300.—The Ghost in Smoke.

In a magic circle of lamps, interspersed with stalls, the performer and spectator place themselves. At a little distance is a pan with fire, from which a sprinkle of perfume powder or ribbon causes a column of smoke to rise; quick-lime vapour or steam will do as well. In the same line beyond the fire-pan is a mirror set at an angle 45 degrees to the spectator and to a magic lantern on the left of the spectator and mirror. A slide of the lantern has a ghost, bogie, elf, demon, goblin, or such like agreeable creature painted on it. The image is projected upon the plane mirror, which reflects it forward to where the smoke intercepts it, and forms a screen on which it is seen by the spectator.

301.—Lantern Conundrums, To Prepare.

To rapidly prepare lantern slides of conundrums, illustrated rhymes or jingles, business announcements, or anything which can be written or sketched with pen and ink: Take a slow gelatine dry plate, $3\frac{1}{4}$ by $4\frac{1}{4}$, with thick film, develop it with oxalate developer of ordinary strength for the average time, say three or four minutes, without having exposed it to light, then fix, wash a few minutes, soak a minute in alcohol, and in a couple of minutes more you will have a plate with perfectly transparent film, on which anything can be written. India ink is best to write with.

302.—Lantern Transparencies without a Camera.

The first thing to do is to select a clean and perfect plate of glass the size of the desired transparency, and to the surface on which the tracing is to be made apply the tongue, taking care that every part of the surface is moistened. This will dry in course of a minute without leaving any stain. Now lay the glass down, prepared side up, upon the engraving or photograph that is to be copied; and by spring clips, a slip of gummed paper, or other means, arrange so that it shall not shift its position. Into a small bottle of common writing ink dissolve a lump of sugar the size of a pea, and with a steel pen having an exceptionally sharp point trace in fine lines the salient features of the picture. While making the tracing the eye should be kept, as near as possible, at a definite fixed spot, so as to ensure accuracy. When the drawing is done it will be found to be so faint when looked through as at first sight to be

worthless, but the greatest vigour may be imparted to all or any desired portion of it by rubbing it firmly with a tuft of cotton wadding charged with fine, dry lampblack. By discrimination when applying the black, any unimportant portions may be left quite faint; and thus by contrast greater force is imparted to parts desired to be displayed with increased prominence.

303.—Small Lantern Screens.

Nothing forms a much better lantern screen than a sheet of pure white paper, when the screen is of small dimensions, such as those generally used in the drawing-room. A thick and strong paper, well suited to the purpose, is sold by most artists' colourmen, and is known technically as continuous cartridge or drawing paper. A couple of yards of this paper, cemented at one end to a common blind roller, and the other to a lath, forms one of the most efficient lantern screens that can be had. When out of use it is rolled up.

304.—Colouring Tracings.

It is always best to colour tracings on the back, as the ink lines are liable to be obliterated when the colour is applied. Mix the colours very dark, so that they may appear of proper depth on the other side. If ink or colour does not run freely on tracing cloth, mix both with a little ox-gall.

305.—Lantern Tank.

Various interesting experiments may be shown by means of a tank. To make one, select two pieces of wood, eight inches long, four inches wide, and five-sixteenths of an inch thick; and at the middle of each cut a hole three inches in diameter; after which cut away the wood surrounding this hole for a distance of about a quarter of an inch, so that the borders of the first-mentioned one will form a shoulder for the part afterwards cut away, the larger aperture being cut to the edge of the piece of wood in such a way that when the two slabs of wood are fastened together, a tank without sides is formed. Two pieces of glass are cut, of a size that will just admit of their being dropped into position; these are kept distended by means of the insertion of a piece of india-rubber tubing, bent horse-shoe form, which, while keeping them distended, forms at the same time a water-tight compartment.

306.—Experiments upon Screen by aid of the Tank.

Place into the tank a solution of blue cabbage, and by means of the pipette add a few drops of diluted sulphuric acid; the blue colour will gradually change to a red. If a little ammonia

be added the colour will again be changed to blue. If more alkali be added, the solution, when stirred, will present a green appearance, and if a little acid is again added to this, and the solution stirred, it will at first become blue, and finally red.

307.—Another Experiment.

Partly fill the tank with water slightly coloured with tincture of blue cabbage; to this slowly add a small quantity of liquid ammonia, in such a manner as not to mix it; then, by inserting the jet of the pipette to the bottom of the tank, add a small quantity of sulphuric acid. The effect upon the screen will be green at the bottom, purple in the middle, and crimson at the top. If the solution be stirred slightly the colour will become red, green, or blue, according to the predominance of one or other of the solutions. If to this a little liquid chlorine is added, the solution will become clear.

308.—Another.

Place in the tank a very weak solution of nitrate of copper; this will appear quite clear, but upon the addition of one or two drops of ammonia it will strike a deep blue colour. The addition of nitric acid will immediately cause the colour to disappear.

309.—Another.

Partly fill the tank with methylated spirits, then carefully place a drop of aniline dye upon the surface of the alcohol. A peculiar effect takes place—the dye descends in the tank for a short distance, then divides in two; each part again descends and again separates, as before; and this continues to go on until the bottom of the tank has been reached. When seen upon the screen the effect will present an appearance of a reversed character, and a coloured tree will apparently grow upwards, each branch becoming subdivided in its upward growth. The effect of this experiment is greatly enhanced if various coloured dyes be used side by side simultaneously, the co-mingling of the branches having a most striking appearance.

310.—Another.

The appearance of a shower of bullets may be presented upon the screen if the tank is filled with dilute sulphuric acid, and a small piece of zinc dropped into it. The generation of the bubbles of hydrogen will, upon the screen, appear as bullets of all sizes.

311.—Another.

Beautiful streamers may be produced upon the screen if a crystal of oxalic acid is suspended in the tank containing hard water.

312.—Another.

An attractive subject on the screen is a volcanic mountain, from which volumes of smoke are apparently emitted. This is done by filling the tank with water, and suspending in it a piece of zinc, shaped to represent a mountain, the top of which must hang downwards. Previously to placing the zinc in position, a piece of piping, with a small outlet, must be soldered down the side of the zinc mountain, its orifice being at the summit.

313.—Another.

In order to cause the smoke to appear it is only necessary to place a drop or two of ink in the tubing, when the appearance of a volcano in full play will be presented. A crystal of permanganate of potash dropped into the tube will also produce the effect of smoke, and it possesses the advantage of being longer in duration.

314.—Another.

Many pretty effects may be produced upon the screen by the aid of a small battery in conjunction with the tank. The electrodes should be made of very thin platinum. Fill the tank with a solution of acetate of lead, and place the two wires from the battery down each side of the tank. As soon as a weak current of electricity is passed, a leaden tree will form at one of the poles, and gradually lengthen out towards the other pole.

315.—Another.

Having filled the tank with a solution of sulphate of soda, coloured with an infusion of red cabbage, which imparts a purple colouration, divide the tank into three vertical compartments, by pushing into it two pieces of porous cardboard. Now pass an electric current through the solution, as in the last-mentioned experiment, the two wires being in the outer divisions. The acid discharged from the one pole changes the colour of that division to red, while the alkali from the other pole will cause the production of a bright green colour. When the current is reversed the colour will gradually change places, that in the centre division remaining of the original purple colour.

316.—Another.

A young smelt, by reason of its thin transparent nature, forms an attractive subject when placed in the tank and projected upon the screen, and will be found to be of great interest.

317.—Another.

The insertion of many small objects into the tank will readily suggest themselves to the operator, such as a spider to represent an octopus, or a stickleback for a whale.



PART V.—Experiments, &c.

318.—Big Head on Small Body, To Produce a.

Place before the sitter a black screen in such a manner as to cover the whole of his body except the head. Then photograph the head as large as you wish, after which shift the screen higher, so as to cover the head and leave the body exposed. Now shift the camera further away, and on a fresh plate photograph the body. In printing, superpose the two.

319.—Cameo Portraits.

Take a negative, fix, wash, &c., and soak for ten minutes in warm water. Then flood it with a solution of nitrate of silver 1 grain, dry pyro 3 grains, water 1 ounce. Leave it in this for three or four minutes; then rinse with warm water, and dry with gentle heat. When dry, the lines of the negative will stand out in bold relief.

320.—Distorted Faces.

By pulling out the swing-back to its fullest extent, and raising or lowering the sliding front, features may be distorted to any extent.

321.—The Changeable Picture.

At the back of a box paste a picture, cut into inch strips, perpendicularly, and each strip separated from the next by -inch space. In each space insert two hoops of wire to form hinges. Have as many 1-inch slips of metal, or thin wood slats, as you have spaces, of the same height as the picture, and fasten two staples on an edge of each to fit into the hasps. All these bands swing freely, and can lay flat on the picture. Have two other different pictures of the same size as the one already laid down, and paste these on the laths—one on one side throughout, one on the other sides, letting them dry, and cutting the laths separate. Then hang them on the hasps, at right angles to the

background frame. Looked at from in front the picture on that back will be seen, the narrow laths, edge on, scarcely interfering with the view. If the laths are drawn to one side so as to fall flat on the picture, their exposed sides will show a new picture ; and if they are swung round again so as to show the picture on the reverse side, three pictures will be seen.

322.—Triplicate Signs.

On this same principle, lettering being substituted for the pictures, a triplicate sign can be constructed, reading, say : "John Robinson," at the back, "Sailmaker" and "Rigger," on the two sides of the laths, one being seen at approaching, one on a front view, and one at a back view. In this case the flaps do not move.

323.—Copying.

Clean the original with cotton-wool slightly moistened with water, spot carefully, light from opposite sides to avoid showing grain of paper, focus carefully, stop down lens just sufficient to sharpen image, but no more ; expose about thirty seconds in diffused light, and during the last few seconds remove stop to soften the contrasts ; develop with old developer, adding new to bring up density. Print on albumenised paper, spot, and burnish.

324.—Enlarging Woodcuts for Diagrams.

Trace the desired picture on a piece of ground glass, using a sharp and well-pointed lead pencil. Hang up the large paper intended for the diagram, and, using the ground glass as a slide in a powerful magic lantern, project the image on to the paper, regulating the size of the picture by approaching or receding from it. Copy the lines on the paper, and, if the operation is carefully performed, the picture will be in perfect proportion, and the most intricate figures can thus be easily reproduced.

325.—Artificial Snow-Scenes.

Artificial snow may be produced on negatives of winter scenery by blocking out the high lights with vermilion, or any non-actinic colour, and sprinkling it over the whole negative by means of a tooth-brush charged with the pigment, and worked to and fro between the finger and thumb, to represent the falling flakes.

326.—How "Spirit" Photographs are Made.

When these are not produced by actual substitution, or what is known to the profession as "palming," chemistry lends its aid

to the perpetration of the fraud. The well-known property of certain colourless salts to assume colour when saturated with equally colourless solution of other salts, is often made use of. A picture painted with a solution of the lead acetate will immediately become black when it is moistened with some fluid containing a sulphite. Silver salts, too, have properties which are exceedingly curious, and a photograph treated by a mercuric solution disappears, to return when moistened with a solution of the iodide of potassium. Perhaps one of the most flimsy impositions is that where two negatives are taken. One of these contains an opaque likeness which, by a very great stretch of imagination, may be supposed to resemble the face or figure of some dead friend or relative, and the other is a simple photograph of the sitter. When these two negatives are superimposed, and the print is made, it will be found that the result presents the dim outline of a ghostly figure hovering above the living subject.

327.—Movable Photos.

Take two photographs of a person in two different positions—for example, a man playing a trombone: the first should be taken when the slide of the instrument is in, and the second when it is extended its full length. By printing from these two negatives separately, and mounting the prints on opposite sides of the same card, and twisting the card to and fro by means of a small handle attached to its bottom edge, the idea of motion is given. The subjects that can be utilised on this principle are innumerable.

328.—Substitute for a Copying Machine.

Write with common writing ink, in which lump sugar has been dissolved in the proportion of 4 scruples, or $1\frac{1}{2}$ dram, of sugar to 1 oz. of ink. Moisten copying paper. Put the paper so moistened upon the writing, and cover with a soft pad of blotting-paper. Place the whole on the carpet or hearthrug, one end of which is to be folded over. By treading upon this an impression will be taken, equal to what would have been taken by a copying machine.

329.—Ghost Pictures.

A good sample of "ghost picture" may be obtained by photographing a group of men playing cards, &c., through a wet sheet, a man rushing in between the sheet and the group with outstretched arm just as you make the first exposure; then remove the sheet, and expose on the group in the usual way on the same plate.

330.—Gelatinography.

A flat metal plate, preferably a zinc plate, three to four millimetres thick, is coated by means of a hair pencil with a fine gypsum paste. Upon this film, when it has become almost dry and hard, draw, with suitable tools, the required design, pressing down, as in etching upon copper, upon the metal plate. To prevent the gypsum from crumbling away during the drawing, it is sometimes advisable to saturate the mass with paraffin. Should, however, any of the gypsum have crumbled off during this process, the surface may at once be renewed with the brush, with which also the ground which is intended to remain white should also be heightened. The gypsum paste may also have a little alum and sulphate of baryta added to it. The addition of gelatine makes it stiffen more slowly. The gypsum may be replaced by a mixture of resins, or of beeswax and paraffin. As soon as the drawing is ready, an edge is put round it, and a film, six to eight millimetres high, of hectographic material (a mixture of bone, glue, and glycerine) is poured over it. Whenever this film is perfectly stiff, it can easily be lifted off from the gypsum, and forms a relief from which one can use to print from in the letter-press. Of course, it must be fixed first to a wooden frame of suitable depth, either by bands or by heating the lower damp surface.

331.—Silhouettes.

Photographic silhouettes may be made with extreme ease. All that is necessary is to have a small, brightly-lighted, white background, against which place the sitter in profile; a quick exposure being given, and the development a little forced.

332.—Bronze Positives.

Coat glass plates with the following preparation :—

Distilled water	3½ ounces
Gum arabic (powdered)	75 grains
Glucose (sat. sol.)	1 dram
Bichromate of ammonia (sat. sol.) ...	3 drams

When dry, expose for, say, five minutes in strong sunlight. Then breathe upon the plate to give it moisture, and dust it lightly with a tuft of cotton-wool charged with bronze powder. Then, with a second tuft, use considerable pressure to impart brilliancy to the bronze. Flow with collodion; when dry, wash in water, and dry by gentle heat.

333.—Iridescent Positives.

To produce an iridescent effect, the collodion used in the above should be made as follows :—

Alcohol	...	...	...	...	7 drams
Ether	...	...	...	...	18 "
Guncotton	...	...	...	...	5 grains

334.—Letter-Press Printing Blocks—Electrotype Process.

Obtain a clean, sharp, original print from an engraved-line plate (the lines should be crossed), and from this take a clear, sharp, black-and-white negative by the collodion method, and intensify by immersing in a saturated solution of bichloride of mercury until quite white, and then well wash with a spray of water, and blacken by pouring over a solution of cyanide of silver; again wash and dry. The negative should be prepared for stripping as follows. Previous to collodionising the plate, it must be well rubbed with French chalk, and well cleaned off with a dry, soft cloth, and dusted; and after the negative has been dried, it should be coated with a solution of gelatine, and dried, and then stripped from the plate. These may be taken in different sizes for fine and coarse work, and kept in a book or press to keep flat; must be kept perfectly dry, or possibly they may, if very thin, cockle. The negative should be sharp and clean, and not intensified. Some plate glasses are carefully cleaned, and coated with a solution of—

Gelatine	...	...	...	...	1 ounce
Water	...	...	...	...	10 ounces

and allowed to set on a levelled stand, and are then put in racks to dry in a current of dry air. These are prepared in different sizes, and kept ready for use; they may be kept for any time like this in a dry place, and may be sensitised in—

Bichromate of potassium...	...	...	1 ounce
B iled or distilled cold water	...	...	20 ounces

Lay in sufficient solution to well cover them for three minutes, put in racks to dry; should be ready next morning (if dried in current of air) for use. To prepare the printing block, put the negative in position in the printing frame, and carefully adjust the transparent film over it, and then take one of the bichromated glasses a size larger than the print required, and place in position to receive the impression on the centre. Cover the back with a black velvet backing, and tightly screw all down in printing frame, and expose to direct light, on a very clear day, about ten minutes; it is best judged by the dark orange colour around the outsides of the bichromated glass. When sufficiently printed, the glass is taken from the frame and laid in ordinary tap cold water for about ten minutes, when it will be seen to have risen up in relief; it is now taken from the water, and laid on a level bench or table, and a plaster mould

taken of it. This is done as follows: Some plaster of Paris, very fine, is finely sifted through muslin, and mixed as follows in a clean basin. Put some clean water, and carefully stir in enough plaster to make a fine paste, and then lay an iron or wooden chase half-inch deep on the gelatine relief, and fill in with plaster, gently rubbing it all over the mould. To shift any air-bubbles, scrape the top level with a piece of iron hooping, and allow to set. The negative can now be removed by turning the chase over and inserting the point of a knife under and lifting it off. Should there be any plaster left in the lines of the mould, it is because the plaster was too old or had been too long exposed to the air, which causes it to become rotten. Never put the water to the plaster; always the plaster to be dropped through the water. If the plaster is good, the cast will ring if tapped with the fingers; if bad, it will sound dead.

335.—Photo-Tint.

A very pure and flat piece of glass is laid upon the varnished side of the landscape negative, and both are fastened together with gummed paper. The whole is then put into a retouching desk for the easy working upon the glass, which, of course, is uppermost; then with moist Chinese white the highest strong lights are painted on the plain glass, and then with thinner white paint, and shade off the secondary; and graduated light-clouds can also be painted in, but very delicately, on the glass over the opaque sky. The negative being underneath, and with a strong reflected light from a piece of silvered glass, shows quite enough of the boundary lines to act as a guide where to paint the effect desired; but as this work is essentially artistic, no instruction can be given, and it must depend upon a close observation of the gradations of the white paint. To know when the right effect has been produced, by holding the two glasses up to the sky, it may be seen whether sufficient depth of opacity has been painted on the glass. The glass is then separated from the negative, and it can be tested by a piece of sensitive paper being laid upon the painted side, and if not quite perfect, can be altered and made right; a print, and preferably a vignetted one, is then made from the original negative, and laid upon a flat board covered with velvet to keep the print from moving. The hand-made negative is now laid painted side on the print, and fitted to its proper position, which is now very easy, as the whole of the detail is seen through the glass; this, of course, is done in a non-actinic light. The whole is now exposed to white light, and watched very carefully. When the desired tint is obtained, the print is ready for being toned.

336.—The Bitumen Process.

Take a quarter of a pound of bitumen, and powder it as fine as possible in a dry mortar; then place this powder in a wide-mouthed bottle, and pour over it eight ounces of common methylated ether, and shake up; then allow to stand a few hours, then shake up again, and let it stand all night (of course keeping the bottle corked to prevent evaporation). In the morning, throw away the ether (not down the sink), and drain the bitumen as dry as possible, then add eight ounces of fresh ether, and with a glass rod stir up the bitumen at intervals for twelve hours, then let it settle, and again throw away the ether, and repeat the operation at least six times; then let the bitumen dry in the dark, and the result will be a little over three ounces of purified bitumen that has cost about seven shillings, and which will coat an enormous area of zinc. About half an ounce of this purified bitumen dissolved in a pint of pure benzole will give a beautiful film of bitumen that is very sensitive to light, easily developed, and which will readily take and hold ink. Polish the zinc plate, first with fine emery, then with rotten-stone, and finally with rouge, always polishing with a from-and-to-the-body motion—not in a circle. When polished, place the plate in a whirler (nothing but failure and bother will result unless a whirler be used), then dust it, and pour over it a little of the bitumen solution well filtered, then set the plate spinning as rapidly as possible, and the result will be a beautifully even coat of bitumen, hard and dry, ready at once for exposure under the negative, and if that negative be a good one—that is, with perfectly clear lines, and nearly opaque whites—the exposure in the sun will not exceed ten minutes, five being about the average; in diffused light an hour will be required. After exposure remove from the frame, and place face up in a tin dish, flood with turpentine, rock gently, and in a few minutes the image will appear, the unaltered bitumen gradually dissolving away; and as soon as the lines are free and sharp, wash the zinc under the tap, and when greasiness has been removed, put the plate into a bath consisting of nitric acid half a dram, water twenty ounces, and a pinch of alum; this will cause the unprotected portions of the zinc to be slightly grained, which will show up the image perfectly clear, and enable the operator to judge whether all the lines are intact. Now rinse under the tap, and rub gently with a pad of cotton wool, and examine the picture; and if any of the details are obscured, immerse in the turpentine again, and rock the dish until the bitumen is dissolved; then wash, blot the water off, and dry the zinc, and, when dry, coat with thick gum, and proceed to roll up either for an etched block, or for a transfer to stone.

337.—Seeing the Invisible.

That certain invisible things or emanations may be detected by means of photography is well known, but that a visible object may be covered by a substance so as to be perfectly invisible to the eye, and then copied in the camera just as if it were not covered at all, if not incredible, is not generally understood ; this, however, can be easily done. A photograph, for example, which is not too strong in contrasts of light and shade, may be wholly obscured by washing it over with a solution of aniline violet, such as is sometimes used for writing ink ; it may then be placed before the camera, and a negative of the unseen image taken precisely the same as if it could be distinctly seen on the ground glass.

338.—Magic Photographs.

Print on albumenized paper, and fix without toning ; then immerse the print in a saturated solution of bichloride of mercury till it entirely disappears ; wash, and dry. Have a pocket-book with a sheet of blotting-paper in it that has been previously soaked in a strong solution of hyposulphite of soda. Show the print to be plain, then place it in the book against the blotting-paper, and in a few minutes (which time you should occupy with a suitable "patter") the original picture will be restored. By having another sheet of blotting-paper saturated with the mercury solution, it may be made to appear or disappear at will.

339.—Miniatures.

Procure an ordinary engraving, pin it out flat on a well-lighted wall, in the centre of which lightly stick the photograph to be reduced. Now place your camera at such a distance as to enable the picture to be reduced the required size, and focus the engraving. By this means the photograph itself, which would be too small to see distinctly, would be also in focus. Micro-photographers, please note.

340.—Moonlight Effect.

Flood an alpha print with a weak solution of ferricyanide of potassium immediately after developing and fixing, and a capital imitation of a moonlight picture will be obtained.

341.—Multiplication of Image.

Fix the picture on a perfectly black background, and focus the size you require. Note also the limits in which you can shift the picture so as to remain on the plate. Then expose in one position, cap, shift the picture, expose again, shift again, and so on.

342.—Pinhole Camera.

Make a square box about 6 inches long and 5 inches square ; form a little door at one end to fasten with a button, and over the other end place a piece of zinc, in the centre of which the smallest possible hole has been made with a small needle, and slightly countersunk. In the dark room fix a plate to the hinged end of the box by means of small clips or drawing pins, and close the end up. Put the whole box into a cloth bag that exactly fits it, leaving the end with the hole open. Stretch an opaque band of elastic around the box lengthwise so as to come over the hole, and you are ready for action. To expose, simply pull the elastic aside. Exposures vary, but a brightly lit view would require about three to four minutes.

343.—Printing Without a Frame.

Hinge two flat pieces of wood together to open out like the back of a printing frame. Cover the front of them with cloth or felt, and around each outside edge attach a rubber or elastic band to keep the negative and the print in position.

344.—Silver Nitrate, To Make.

Dissolve a shilling in nitric acid diluted with twice its bulk of water. Evaporate this solution to dryness, then re-dissolve, filter, and again evaporate, when it will be fit for making up a bath.

345.—Silver-Plate Copper, To.

Instead of throwing away your old, used-up hypo bath, utilise it by immersing articles of copper or brass in it for twenty-four hours, when they will be found to be beautifully silvered. Dry, and polish with chamois leather.

346.—Spirit Photographs.

Dress your model in a white sheet, and photograph against a black background. If another picture be now taken on the same plate, it will have the appearance of being transparent, the "ghost" showing plainly in the rear. I should have remarked that the "ghost" exposure should be an instantaneous one, for in this lies the secret.

347.—Stereoscopic Effect.

Superpose two stereoscopically taken pictures, one on the other, and make a negative from this combination print. The resulting picture will possess considerable roundness, and sometimes appear almost "solid" to the naked eye without the interposition of a stereoscope.

348.—Another Pleasant Surprise

Is produced by inserting a stereoscopic negative and a stereoscopic positive side by side in the slide, and viewing them by transmitted light.

349.—Photographic Illusions.

The best way is to supply combination printing—make negative of man shaking hands with someone; then in second negative place him in the second position; make print from first negative, and cut out of print and stick on negative as mask all those portions which require blocking out, *e.g.*, the figure of the someone not intended to appear; the remainder of print forms mask for the second negative, care being taken to select lines for cutting along which will be easily touched out, as the edge of cuff of shaking hand.

350.—Double Exposure.

Several very clever illusions can be done by means of double exposure, and this is considerably easier than reflection. One of the best is “a man playing chess or cards with himself.” This is done by means of a black background. In the centre of the picture place a table on which you can put the required ornaments, then place (on one side of the table only) a chair on which the subject sits, and you arrange him or her as you think best. Be sure and not have any part of the subject overlapping the table. Expose the plate, and note the time accurately. Remove the chair and take it round to the other side; arrange subject, and give exactly the same exposure as you did before.

351.—Statuary Portraits.

Negatives must be taken, suitable for C.D.V.'s, cabinets, &c., from a plaster or marble pedestal rectilinear in outline, and lighted in more ways than one to suit variations in the portraiture. These negatives must be on paper or films. Whichever form is used, it must be transparent. It then remains only to cut out the pedestal from the paper or film with knife or scissors, and to adjust it under the portrait so that the top edge of the former registers with the bottom edge of the latter, and both are printed together at one operation. The background will therefore be an unbroken black, and the join between the two subjects on the print will rarely want a single touch of the paint brush. Care, of course, must be exercised in opening the frame during printing, in order not to displace the pedestal negative; but if the back be one of those made to open longitudinally, even this precaution is unnecessary. The chief thing is to have the paper or film as thin as possible, and to print either on a turn-table, or

with frequent changes of position, to work right up to the edge of it. Do not take one negative in one light, and the other in another. The shadow that would be cast by the bust overhanging the pedestal may be fairly imitated by something superposed at the time of taking; or a bust with pedestal could be photographed, and the former could be removed in cutting ready for printing.

352.—Another Plan.

Take a negative which is not quite what you could wish it to be, and, having washed it quite away, proceed to fix your transferotype picture to the glass; then give the back of the plate two or three coats of white lead mixed with turpentine, and finish with a coating of varnish. This plan may also be tried with ground glass. Or transfer a picture to plain glass, as at first, and paint as before, but on the picture instead of on the back of the plate. A better result still might, perhaps, be obtained by painting on glass as before, and finishing with one of the white enamels advertised to resist boiling water, then rubbing down to a matt surface with fine pumice dust, and after giving plenty of time to dry hard, transferring the print.

353.—Another.

The use of transferotype paper is not confined to glass plates alone, as plaques, vases, and, indeed, anything which will withstand the application of the hot water used in the process, may be decorated by its aid, and can be rendered washable by being coated with colourless varnish. Excellent lantern slides may also be made with transferotype.

354.—To Convert Photographs into Line Drawings.

There are two methods by which a photograph can be prepared for this purpose. The first consists in printing the photograph in the usual way on either plain or albumenized paper, and fixing it, care being taken not to tone it with gold. When washed and dried the image is of a brown colour. This must be gone over with a steel pen charged with very black ink, so as to ensure the chief features in the photograph being translated into lines more or less thick. When the drawing is completed, the paper is floated upon a solution of bichloride of mercury, by which the photograph disappears in consequence of its bleaching, leaving the ink lines. From this drawing a negative is made. The second method consists in sensitising the paper by sponging it over with ammonio-oxalate or citrate of iron, exposing under the negative, and developing with a wash of potassium ferridcyanide. This gives an image in a blue colour, which does not

require to be removed in the after-process of producing a negative from the pen-and-ink drawing.

355.—Gold Chloride, To Make.

Take a half-sovereign, bend it, and put it into a glass bottle that will stand heat, and place this bottle in a basin half filled with sand; then mix in a glass measure 1 dram nitric and 5 drams hydrochloric acid, and add about 3 drams of this mixture to the gold in the bottle. Place the whole on the hob by the fire, and let remain an hour, giving the bottle a gentle shake occasionally, when the greater portion of the gold will be dissolved. Now pour off the clear liquid into a 15-ounce bottle, and add a little more of the mixed acids to dissolve the remainder of the gold; then pour the whole into the 15-ounce bottle. A few small lumps of common whiting must now be added to the gold solution to neutralize it (which may be ascertained by means of litmus paper), and the whole made up to 15 ounces with water. You will now have a solution of gold consisting of 8 grains to the ounce, and equal to eight 15-grain tubes.

356.—Postage Stamps, Photographic.

Sketch a pretty border on a piece of cardboard, in the centre of which place the photo. to be reproduced. Then proceed as directed in *Multiplication of Image*. After printing, toning, &c., gum the back of the sheet, and perforate it with a pin, or get a printer to do it for you by machine.

357.—Another Plan.

Fix the postage stamp to be copied on a piece of card, and copy the stamp as large as you can, so that the middle will be large enough to take the head you wish to put in it; then mask out the middle of the negative and print; make another mask for the outside of the stamp, and print in the head; now copy it; then print on thin paper and gum the back. The perforating can be done with an ordinary fine needle in a sewing machine, thin point down, and not too small stitches.

358.—Photo-Crayon Portraits.

This is a method of producing a delicate style of portrait, consisting of a transparency on glass, the lights of the portrait being formed by a tinted paper backing. The picture is made from an ordinary portrait negative, which should be soft, sharp, and clean. Place the negative in a copying camera for transparencies, or in the window of a darkened room, and proceed to make a transparency from the negative. Provide a screen outside the camera, and in advance of the negative, of a somewhat oval shape, and allow the light to pass through this aperture on to the negative so that only the head and shoulders are visible, the rest

being vignetted gradually away. Make the image to yield a head of about an inch and a-half in size. Any ordinary good bromo-iodized collodion will do if half a grain of chloride of ammonium to the ounce is added. The nitrate bath should be as nearly neutral as can be worked without fogging. The developer should be :—

Pyrogallic acid	...	...	...	...	2 grains
Citric acid	...	...	...	...	$\frac{1}{2}$ grain
Glacial acetic acid	...	...	...	...	30 minims
Water	...	...	...	...	1 ounce

The exposure should be abundant. If the image is under-exposed, or too much developed, it will be a disagreeable colour, and be deficient in delicate definition. During development the action must be carefully watched, something like developing a glass positive, and directly the details are visible—without washing off—saturated solution of hyposulphite must be flooded over the plate to fix it. When fixed, the plate must be well washed and dried, and, if the operation is perfect, the transparency will show, when laid on white paper, as a portrait with a white vignetted margin, the whites in all cases being supplied by the paper backing. Much of the beauty of these pictures is due to the tinted backing not being in absolute contact with the image. These pictures can be produced by the magnesium light.

359.—Crystal Mirror Photographs.

A plain, unmounted print is fastened to the back of the glass, and the background being eaten away, thus making the figure stand out in relief. The silvering compound is then applied to the glass.

360.—Diaphanotypes.

Produce a good photograph on plain paper, with all the delicate half-tones of the negative well preserved. Let it be deeply printed. Do not attach the print to cardboard; retouch the unmounted print in the shadows of the drapery, but do not interfere with the face. Place the print in contact with a piece of the best white plate glass, using the following solution :—

Canada balsam	...	...	...	...	2 ounces
Turpentine	...	...	...	...	1 ounce

Pour this over the glass in much the same manner as collodion, and lay the print down on it, and with the finger or a soft pad commence from one corner carefully to press out all air-bubbles. When the picture is sufficiently set to paint upon, work in the local colours of the face, drapery, and accessories, in oil colours, having a careful regard to the general outlines.

361.—Nature Printing.

There are two methods employed for obtaining facsimiles of ferns, leaves, sea-weeds ; one suited to the amateur, the other for commercial purposes. 1. For the former the requisites are small quantities of coloured printing inks—black may be used, but the natural colours look much better—a little cotton-wool, and some pieces of very soft wash-leather. Either fresh or dried leaves may be used ; the former require no preparation ; the latter should be dipped in water, and then left between damp blotting-paper for some time to become tough. A dabber about the size of a marble is made of cotton and soft leather tied up, a small quantity of ink of the desired colour put on a piece of glass, and the dabber covered with it, using as little as possible. The side of the leaf from which the impression is to be taken is then laid face upwards on a piece of clean paper, and the dabber employed lightly to coat all the prominent parts of the leaf with the ink. The leaf is then laid, ink side downwards, on a piece of moistened paper, covered with another similar piece, which may be kept in place by lead weights if necessary. The part under which the leaf remains should then be carefully pressed with a dabber similar to that used for the ink, taking care to go steadily and evenly over the whole surface of the leaf.

362.—Photo-lithography.

To produce a photo-lithographic impression of a negative, proceed as follows:—Procure a solution of gelatine to which is added a small quantity of albumen in combination with a solution of bichromate of potash, and in a warm state spread it on a sheet of fine-textured paper with a flat brush in a room partially darkened, and hang it up to dry, excluding it from light. The negative or glass picture having been placed in a photographic copying frame, place over the negative the prepared paper, over that a piece of fine woollen cloth, and screw all in the frame together, and expose the copying frame and negative to diffused light for ten or fifteen minutes ; the light passes through the transparent parts of the negative on to the paper, which, by the chemical action of the light on the chromatised paper, will affect it, turning it from a yellow colour to a deep brown, while the part of the negative which intercepts the light is not chemically acted upon in consequence of the absence of light, and remains light yellow. When removed into a darkened chamber, and the chromatised gelatinised-paper examined, a perfect brown impression will be seen impressed thereon. The next operation is to cover the whole surface of the page with lithographic transfer ink, evenly, and reduce in quantity by wiping it off with a fine

rag; then lay by for an hour or so. The principle involved by the action of light is to render the chromatised gelatine, when acted on by it, insoluble in warm water; therefore, if the prepared paper be placed therein, it will not affect the brown shade of the impression, which is now covered with transfer ink, but all the rest will immediately wash away, leaving a perfect impression of the picture on the paper in transfer ink; a suitably prepared lithographic stone, or plate of zinc, is put into a lithographic press, the stone or plate partially warmed, and the transfer, dry, is placed face on stone or plate, and passed through the press slowly and with a good pressure—only once through—when, on removal, it will be found effectually transferred to stone or plate, and any reasonable number of copies can be struck off in printers' ink.

363.—Litho. Copies.

Adopting precautions not to grease the surface of the print, the outlines, or as many of the details as are requisite, of the subject are gone over with a finely-pointed pen or crowquill charged with lithographic transfer ink, objectionable portions being left out or altered to suit artistic requirements. When finished, it is laid face down on a polished lithographic stone, and the tracings transferred by passing it through the press. Impressions are then printed in the usual manner.

364.—The Miniature Camera Obscura.

Procure a small pill-box, a minute fragment about half an inch square of broken looking-glass, and a fragment of beeswax. Bore a small hole in the centre of the lid of the pill-box, and another in the side; then, with the aid of the beeswax, stick the piece of the mirror across the bottom of the box at an angle of forty-five degrees to the axis of the disc of the box, so that by looking through one hole you can see objects through the other hole, thus enabling a person to look behind him.

365.—Photographic Visiting Cards.

The most artistic way would be to make some stamp photographs of yourself, and mount them neatly on your visiting cards, having a black border printed around them.

366.—Another Method.

A very artistic effect could be obtained by making a transfer on to the cards with Eastman's transferotype paper. If this is done neatly and well, a better result could not be wished for. A Woodbury print might answer the purpose.

367.—Another.

To make visiting cards, expose a piece of bromide paper under negative of self, masked, so that the head occupies the left top corner only. Across the card, from the left bottom corner to the right top corner, write your name, and in the right bottom corner your address. This you must reduce to the proper size in the camera, and having got a negative of your photograph and autograph, proceed to print in bromide, and enamel. Whilst on the glass, paste a good thick notepaper to the back of the print.

368.—The Stereoscopic Ghost.

A model got up as a ghost is posed in the middle of an apparently terrified group of performers, and a plate is exposed; the lens is capped before the exposure is completed; the ghost quietly walks away; a further uncapping and completing of the exposure give a ghost picture. *La Nature* improves upon this original method. The terror-struck victim is seated in front of a house, and an ordinary exposure given. The sheet-clad ghost then stands before him, the camera is brought forward so as to take the ghost of a size that almost fills the picture, a momentary re-exposure is then given, which is quite enough to cause a shadowy impression of the ghost, but not to injure the rest of the picture.

369.—Head on Plate.

This curious phenomenon is produced by getting the sitter to hold half a plate against his throat above his collar, and covering the remainder of his body, including the hands, by hanging a black cloth in front, as in a previous experiment; then cover the face, get the sitter to hold out his right arm as if in the act of holding something, and take another plate without shifting the camera. In printing, superpose so as to get the bodiless head with plate beneath exactly over the outstretched hand.

370.—The Ivorytype.

Make a good print on plain paper; if the portrait is that of a fair person, let the tone of the print be warm; if of a dark person, let it be a cold tone. The print has to be coloured on the surface as an ordinary coloured miniature, only colouring it stronger. To communicate to it the softness, creamy delicacy, and transparency of an ivory miniature, attach it to white plate-glass by white wax and gum dammar. Melt in a jar by gentle heat 2 ozs. of the best white wax, and add a piece of gum dammar about the size of a hazel nut. When these are thoroughly mixed, place a little on the clean glass plate which is to receive the picture. Heat the plate gently, and when the gum and wax melt and flow over the plate, the coloured photograph must be carefully

laid down on the melted wax, care being taken to avoid air-bubbles, and to preserve an equal layer of wax all through. Should air-bubbles show when the plate is cold, or the wax appear unequally thick, the plate can be re-warmed, and, with a warm palette knife, the irregularities removed by gentle pressure.

371.—Heliotype.

When a layer of varnish composed of gelatine and bichromate of potash is spread upon a suitable surface, and is then dried in the dark, it forms a sensitive compound upon which the light exercises such action as to cause it to resist water, the parts unacted on being capable of absorbing water. An ordinary photographic negative is then placed upon the film; those parts through which the light passes are rendered insoluble, whilst those parts unacted upon by the light are capable of absorbing moisture when the negative has been removed, and the film slightly damped. Thus, when a roller charged with greasy ink is passed over the surface, the ink adheres to those parts only on which the light acted, the water with which the other parts are charged preventing the adhesion of the ink. The proofs are then obtained by means of the usual printing press.

372.—Photo-Engraving.

An ordinary carbon print is developed on a polished plate of copper, this being thinly plated with silver. While the carbon print is still wet, fine sand, previously slightly waxed or stearined, is dusted on it. When all is dry, the sand can be removed by a gentle friction, leaving the gelatine in a grained condition. Blacklead is then gently rubbed on the picture.

373.—Post-Mortem Photography.

One very useful application of the magnesium flash-light lies in the direction of post-mortem photography. In most instances it is impossible to move the body into a more favourable position, and, in some cases, the window-blinds even are not allowed to be opened. Much of this difficulty may now be overcome by the use of magnesium powder. This, when employed with discretion, will enable negatives to be secured which would otherwise have been impossible. In its employment it may be advantageous to burn the powder, in different quantities, in more than one part of the room, in order to avoid over-intense shadows. However, when this is done, the combustion of the different lots need not be simultaneous.

374.—Copying Instrument.

The mechanograph consists of an elastic cord which is fixed

at one end, while at the other end is a pencil. At any point between the fixed end of the elastic cord and the pencil end there can be fixed a light metal pointer. Holding the pencil in the hand, the cord is stretched so as to bring the pointer on some part of the original sketch to be enlarged, after which the pencil is pressed against the paper, while the pointer is made to travel over the lines of the original. Hold the pencil upright.

375.—Engraving on Glass.

The glass or metal to be engraved is cleaned thoroughly, and polished. A paper stencil of the desired form is fastened to the glass or metal plate by means of mucilage of good quality. The pattern should be made of thick writing paper, and care should be taken to see that every part of the paper is thoroughly attached to the plate. Any gum around the edges of the paper should be removed by means of a moist sponge. The exposed parts of the plate must be perfectly clean and free from streaks.



PART VI.—Miscellaneous.

376.—Flashlight.

A piece of lamp-wick three or four inches long, saturated with spirit (methylated will do as well as the pure spirit), and placed on a plate of metal and ignited, will give as strong a flame as the lamps. A block of wood, or any flat surface, dropped upon the wick after use will make an efficient extinguisher. From a sheet over a large clothes-horse a good reflector can be extemporized. For discharging the powder, if you happen to have an old india-rubber pneumatic ball with india-rubber tube attached, you will have all that will be required, or the apparatus can be adapted from domestic appliances which may be found in almost every house. Insert in the end of the tube a quill of moderate length; to use it, compress the ball and insert the end of the quill into the powder, remove the pressure from the ball, when a charge of the powder will be drawn up into the quill; the quill can be marked in five-grain charges, so that it may be charged with whatever amount may be desired without the trouble of weighing. To discharge the powder, compress the ball again.

377.—Pyrotechnic Mixture.

Equal parts of powdered chlorate of potash and magnesium powder. Do not attempt to powder the chlorate yourself, as the friction of the pestle might explode it; you can purchase it already powdered, and you can mix it with safety with your finger in the palm of your hand, or in a cup with a bone spatula or paper-knife. Place it on a metal plate to fire it.

378.—Simple Exposure-Meter.

To a cord forty inches in length, attach a lead weight (about half ounce) of a globular form (a small plumb-bob will answer admirably). Fasten this under the tripod-head and swing it to and fro. The vibrations will be exactly of a second's duration.

379.—Flint for Retouchers.

Procure two gritstones, such as mowers use for whetting their scythes, one of them very coarse in the grain, and the other fine. Get the faces of the two stones ground perfectly flat. Have the edges of the coarse stone rounded a little, so that its rough particles may not catch the lead too eagerly, and possibly snap it short off by the end of the holder. To put a fine point on a new lead, bring it out of the holder a little bit at a time, and grind it by passing the lead from your right to left along the face of the coarse stone, at the same time rotating the holder between the fingers and thumb, and drawing it slightly towards the body. After nearly a quarter of an inch of it in length has in this way been sufficiently reduced by grinding on the surface of the rough stone, finish the operation on the smoother one.

380.—Singular Stereoscopic Effect.

A very singular effect is produced when a photograph of the roof of an interior, or even a railway bridge, when taken from below, is viewed in the stereoscope. It is an altogether unmeaning thing until the stereoscope with its picture is pointed upwards, when the subject is adequately realised.

381.—Clouds in Bromide Enlargements.

Make two transparencies, one of the negatives to be enlarged, the other of a suitable cloud effect; place one on the other, and make a negative by contact. If carefully done, this may be enlarged from to bromide paper, giving the effect required.

382.—Another Method.

Perhaps the easiest of all methods is to make a small transparency from the negative to be enlarged, and cover it with a glass bearing the clouds, make an enlarged negative from this, and print by contact. Paint over the sky of the negative to be enlarged so as to make it absolutely opaque. Expose and develop the paper in the usual way, and wash thoroughly in acid, and then mask the landscape by means of non-actinic paper, and expose for suitable cloud negative. It may also be done by masking the cloud negative with some opaque paper or paint, so as to just coincide with the outlines of the landscape. Then, having exposed for the landscape, remove the negative and insert the masked cloud, and again expose.

383.—Another.

Get a sky negative same size as the negative to be enlarged from, and one that suits the landscape. Lay the view

negative down (film downwards) on a piece of white paper, and upon it place the sky negative (film down), and mark roughly where the sky-line should be with Indian ink and a brush. When this is done, place your view negative in the enlarging camera and focus to size required, and note where the sky-line should be so as to help afterwards. Then have a wooden cap made for the lens with a piece of yellow glass in it, which place on your lens, pin on your paper where required, and cover paper and screen with a black cloth; then take out view negative and put in sky one (have a large piece of cardboard in your hand ready to vignette your sky), take off cap and vignette view part of enlargement; give the required exposure, which, as a rule, is one to four, viz., sky one minute, and view subject four minutes; put in the cap again, cover over with cloth, and take out sky negative, and put in view negative. Take off the cap and give exposure as required, but this time you vignette the sky part.

384.—Another.

If the negative be thin enough in the sky, the clouds might be dodged in by using the stump on the ground glass or tissue paper backing. If, however, the sky in the negative be dense, there is no help for it but to block out the landscape and print in the clouds from a cloud negative same size as the landscape negative. The best way of preparing the blocking-out arrangement is to print a silver print, and then, before washing, with a sharp knife cut along the outline; the one part will do for blocking out sky, and the other for blocking out the landscape. The two parts are allowed to get quite dark in the daylight, then washed and fixed. To secure correct registration, get a carrier which holds the negative to be enlarged without any space to spare. Then, using the negative varnished, squeegee the block carefully on to the varnished side, using glycerine (pure) to moisten it (having cut it slightly smaller than the negative), placing the cloud negative where the other was in the carrier, and the landscape negative behind. To obviate any harsh line between landscape and clouds, a screen should be kept moving in a vertical direction while the cloud negative is being exposed.

385.—Medallions.

The glass upon which the picture is mounted, and the back, being placed in their proper position in the rim, the whole is placed face downwards upon a board, sufficiently solid that it will not easily give under the pressure which is to be used. The rim should then be slightly turned over all round by means

of a steel rod, or the back of a large key, the handle of which affords a better hold in the hand, and so on until the back is perfectly flat and level.

386.—Making Window Transparencies.

Suitable positive transparencies are selected and arranged upon a sheet of paper. A sheet of thinnish glass, the size of a window pane, is procured, and the transparencies, as arranged in their places, affixed to it by either copal varnish or Canada balsam. Strips of colour glass are then cut the proper size to fill in the spaces between the pictures, or, so to speak, frame. These strips are similarly fixed to the sheet of glass, and the whole left for twenty-four hours in order to allow the varnish or balsam to dry. When dry, all the corners and edges should have a strip of tinfoil cemented to them to finish them off. The screen is then ready. To decorate the window, cement the transparencies directly on to the glass of the window pane, and treat the coloured glass strips as before.

387.—Another.

Sometimes, instead of strips of coloured glass, designs in matt glass are used to enclose the pictures. The required pattern is cut out of stiff paper—that is, the design to be left clear is cut out in stiff paper, and this paper stencil is pasted on to the sheet of glass to be ornamented. When dry, it is fixed flat at the bottom of the box, some twenty-five centimetres high, with the paper side up, then some five or six hundred grammes emery powder and the same quantity of small shot are placed on it and shaken vigorously backward and forward until the constant rubbing of the emery and shot has roughened the exposed surface of the glass. When sufficiently roughened, take it out and wash off the stencil. The finer the shot and emery powder the finer the grain of the ground-glass part. If flashed glass be used instead of plain, a coloured design upon a matt white ground will be obtained.

388.—Photographing Marble.

Hang a black velvet or cloth curtain in front of marble, leaving a hole only for the lens to peep through, and light by means of two oil lamps, one on each side. An isochromatic plate would shorten the exposure considerably, if artificial light were used.

389.—Another Plan.

A tablet could be taken by any of the many methods of artificial light; but the best result would be got in daylight by using a piece of tin, arranging it to reflect a strong light on

the marble. To avoid reflection of camera on the marble, take it from some distance off, using a long focus lens. Use a slow, thick coated plate.

390.—Another.

The only satisfactory way of doing this would be by artificial light. Two flashes should be arranged so as to form an angle of about 60° with one another, with the object at the apex of the angle. They must be placed on a line with the camera—neither in front nor behind it. The flashes may both be made with the same lamp, as they need not be made at the same time. It is only necessary that the camera be kept perfectly rigid during and between the flashes.

391.—Another.

If white marble, better “back” the plate. To overcome difficulty of unequal illumination—(1) Either obtain the assistance of a friend, and hold a black cloth over the light half of the monument, moving slowly to vignette the margin of cloth into the shadow. Continue this for perhaps one half the exposure, and then expose on the whole of the tablet; or (2) make a cap of cardboard to fit the lens, cutting away sufficient of the cover to expose, say, one-third or one-half of the lens. Place this partial cap upon the lens, and turn it into such a position that it equalises the light falling on the plate, enlarging the aperture if necessary. Leave this cap on during the whole time of exposure.

392.—Another.

Procure a long piece of white cardboard or cartridge paper, about eighteen or twenty inches in width, and bend it into the shape of half a regular hexagon, if the marble is a square one; if oblong, bend it so that the three sides correspond to the top and two sides of the marble; fasten the side corresponding to the top to the underside of the gallery, and let the other two sides fall into their places, forming a kind of awning. Then place the camera in position, and focus carefully, using a large stop, and cap the lens. When the time is arrived to make an exposure, verify the focussing by means of a taper held close to the black portion, cap lens, and put in the dark side, raise the shutter, and bend back out of the way. The ground glass is now held upright to the camera, and forms a screen, behind which an inch or two of magnesium ribbon is burned. Having uncapped the lens, get an assistant to hold up the screen, and then burn an inch of ribbon behind it. If the dark slide has two plates in it, give another trial, using two inches of ribbon. If inconvenient to use focussing screen, use a piece of ground glass in the same position.

393.—Enlarging.

Make or procure an old 24 by 20 camera (without lens), and affix an arrangement by which you can attach your quarter-plate camera to it, front to front. By placing the negative to be enlarged in the small camera, and the paper in the back of the big camera, you can make any size enlargement you require in the open air with very little trouble. The focussing is done in the ordinary way with the cloth.

394.—Freckles.

The easiest way to make the complexion appear clear on the negative is to rub the face briskly with a rough towel just before exposing.

395.—Glass, To Grind.

To get a fine grain on glass, rub two pieces together by placing one on a table, and moving the other in a circular direction upon it. Between the two put flour-emery and water, and finish with the bottom of a porcelain cup.

396.—Improving Landscape Negatives.

Negatives with too much contrast may be greatly improved by pasting tracing-paper over the back, and applying oil with a fine brush to the dense parts.

397.—Labelling Bottles.

Mix pyrogallic acid and sulphate of iron in equal parts. This will form an intense black ink that nothing will bleach, while the application of a little varnish over the whole label will prevent it from being affected by moisture.

398.—Plate Boxes, To Utilize Empty.

Take two boxes same size, separate the in from the outside, then bring the two insides together edge to edge, and paste a band of stout brown paper round three of the sides. Do the same with the outer lids, and set aside to dry. Then with a penknife cut out the unpasted sides, and you have a light-tight box, which only requires to be fitted with grooves in order to make it a useful accessory of the dark-room.

399.—Copying Dodge.

Extension of camera may be easily effected by the use of a Chicago meat tin, a few pieces of wood, and a little Brunswick black. All that is necessary to do, is to cut both ends of the tin perfectly square, and make a small grooved frame to fit into the small end for the lens to slide into, as in the camera, and a larger

one to fix round the other end, which must be rabbeted to slide into the front of the camera. The inside should be lined with black paper, and the outside painted with Brunswick black.

400.—Etching Bottles.

Etch or engrave the name of the chemical or solution direct on to the bottle; the writing fluid for this purpose is dangerous to prepare and use, and difficult to store. The following formula has been found very efficient:—

Barium sulphate	...	...	...	...	3 ounces
Ammonium fluoride	...	...	...	...	1 ounce

to which add sufficient sulphuric acid to decompose the ammonium fluoride and make the mixture semi-fluid. The ink must be prepared in a leaden dish, and kept in a lead or gutta-percha bottle. It is applied to the glass with a camel's-hair brush or quill pen, and when sufficiently etched and granulated, letters should be filled in with some white or black pigment.

401.—Paper Labels.

As an adhesive preparation for paper labels the following formula is a good one:—

Gum arabic	...	...	...	...	1 ounce
Gum tragacanth (pulv.)	...	...	...	...	1 "
Acetic acid	...	...	...	...	40 minims
Glycerine	...	...	...	...	1 ounce
Water	...	...	...	...	2 ounces

Dissolve the gums in the water, hot; then add the acid and glycerine.

402.—Non-corrosive Ink for Labels.

The following will be found as near indestructible as writing fluids can be made:—

Oil of lavender	...	...	...	...	1 ounce
Powdered copal	...	...	...	...	1 drachm
Lampblack	...	...	...	...	6 grains
Indigo	...	...	...	...	2 "

Dissolve the copal in the oil by gently heating, then add the lampblack and indigo. After the label has been written with the above ink and attached to the bottle with the aforementioned adhesive mixture, coat both label and upon the glass surrounding it two or three times with the following varnish, by means of a camel's-hair brush, first sizing the label with a solution of isinglass in water:—

Canada balsam	...	...	...	...	1 ounce
Spirits of turpentine	...	...	...	...	2 ounces

403.—To Cement Lenses.

In some lenses, especially those of foreign make, an arborescent appearance is occasionally to be seen between the elementary parts of which the lens is composed. To remedy this, unset the lens, place it in warm water, which may be still further heated till the balsam softens, separate the components, and clean with ether, benzole, or turpentine. Next place a drop of pure balsam on the centre of the concave surface, and gently press the convex one down upon it until the balsam spreads and oozes out at the edges. Then apply a gentle heat until the balsam is found to have been hardened.

404.—Cutting Glass.

Glass can be cut quite readily with a hot iron. Take an iron rod half-an-inch in diameter, and file its end off smooth and flat, like the flat end of a cylinder. This rod heated red hot and held to the glass, the edge of the smooth end just touching the glass a short distance from a scratch made with a file, will start a crack, and the crack will follow the iron, as it is moved in any direction.

405.—Another Way.

As an example of the use of the hot iron to cut glass, if a figure be drawn on paper and placed under a sheet of glass, the outline of the figure can be followed with hot iron, and the glass cut to the required shape. Fancy-shaped glasses can be so cut with ease. The bottom can be cut off from a bottle, to convert the bottle into a funnel for filtering very readily by starting the crack with a file, and then carrying it around by means of the red hot rod of iron. Care must be taken to have the end of the rod square with the side of the cylinder.

406.—To Render Windows Translucent.

Windows may be frosted by the application of a very strong and hot solution of sulphate of sodium or magnesia and gum arabic.

407.—Translucent Varnish.

A finer though more expensive varnish is made by dissolving (for twenty-four hours) pulverized gum tragacanth in white of nine eggs well beaten. Lay a coat of this on the windows, and let it dry.

408.—Substitute for Ground Glass.

It consists of:

Water	...	...	...	...	...	1 pint
Gelatine (common)	...	...	...	...	...	5 ounces
Glycerine	...	...	...	...	...	$\frac{1}{2}$ ounce
Oxide of zinc (zinc-white)	...	...	...	...	...	1 "

After soaking the gelatine in the water for a few hours it is dissolved by gentle heat, and then filtered through flannel. The zinc-white is placed in a mortar with the glycerine and one ounce of water, and made into a soft paste. It is then stirred into the warm gelatine, and allowed to stand for a couple of hours, keeping the solution warm to allow the coarser particles to settle to the bottom; the upper portion is then carefully decanted to get rid of the sediment, or, if it be allowed to cool and become a jelly, a slice can be cut off the bottom, removing all the coarse particles. The varnish should be used at once, as it does not keep well in bulk.

409.—To Prevent Plates Frilling.

Before developing, brush round the edges of the plate, about a quarter of an inch deep, a little palm oil, which will prevent the developer acting on the film at the edges and spreading to the centre.

410.—Silvering Large Mirrors for Photography.

Dissolve 150 grains of nitrate of silver in 6 ounces of distilled water, and to this add ammonia, drop by drop, until the precipitate at first thrown down is re-dissolved. Now, having made a solution of caustic potash, in the proportion of $2\frac{1}{4}$ ounces of the potash to 50 ounces of water, add 15 ounces of this to the above solution of silver; and add ammonia as before, until the deep-brown precipitate again thrown down is re-dissolved. Now add 29 ounces of distilled water, after which allow some solution of nitrate of silver to be dropped in, gently stirring all the while with a glass rod, until a precipitate begins to be formed. Previous to the immersion of the glass to be silvered, dissolve 1 ounce of sugar of milk in 10 ounces of water. This must be filtered and kept in a separate bottle. Have ready a clean glass vessel of a size sufficient to contain the glass plate to be silvered; when everything is ready, mix together the silver solution with that of the sugar of milk, in the proportion of 10 of the former to 1 of the latter. Lower the glass down in the solution until it is a little distance from the bottom, and allow it to remain there for a period of time varying from fifteen minutes to four hours, according to the thickness of the coating of silver desired. After removing it from the bath, wash with distilled water, and, when dry, polish by means of a soft pad of cotton-velvet charged with rouge.

411.—A Good Tray.

Take good, dry, thin boards, and make the dishes of any desired size or shape. Next lay over the dish a piece of unbleached

cotton cloth, and with a hot laundry iron spread the cloth over the inside of the dish with melted beeswax, folding in the corners, and running the wax thoroughly into the cloth and wood. Run a sharp knife around the edges of the dish, cutting off the extra cloth, and fasten down the edges with the melted wax. Give the outside of the dish a coat of boiled linseed oil, and one or two coats of asphaltum; varnish to keep out the water. Should the wax get thin, or wear off in spots, melt a little more on with the hot iron.

412.—Preservative for Solutions Containing Citric, Tartaric, or Acetic Acids, &c.

Fungoid growths may best be prevented by the addition of a minute quantity of salicylic acid, say one or two grains to the pint of solution.

413.—Very Rapid Plates.

Prepare two separate emulsions as follows:—

No. 1 EMULSION.

Nelson's No. 1 gelatine ...	...	...	24 grains
Distilled water ...	...	...	2½ ounces
Bromide of ammonium ...	...	...	120 grains
Iodide of potassium ..	...	...	5 "

Dissolve the above, and when cooled, add:—

Liquor ammonia ...	...	...	1½ drams
Alcohol (pure) ...	...	...	5 "
Distilled water ...	...	...	10 "

Stir well, and add in a thin stream:—

Nitrate of silver ...	...	...	180 grains
Distilled water ...	...	...	12 "

Keep in the dark without heat for twenty-four hours.

No. 2 EMULSION.

Nelson's No. 1 gelatine ...	...	...	20 grains
Distilled water ...	...	...	4 ounces
Carbonate of ammonia ...	...	...	60 grains
Bromide of ammonium ...	...	...	160 "
Iodide of potassium ...	...	...	5 "

Dissolve, and add in a fine stream, constantly stirring:—

Ammonio-nitrate of silver ...	...	...	240 grains
Distilled water ...	...	...	4 ounces
Nitric acid ...	...	...	2 minims

Place the jar in a large vessel containing boiling water, and cover up with a blanket for twenty-four hours. Then put 240 grains

of Nelson's gelatine (dry) into No. 1 emulsion, and dissolve gently; and 360 grains of Heinrich's gelatine (dry) into No. 2 emulsion, and dissolve in the same manner. Then mix the two emulsions together, and pour out to set. After another twenty-four hours, break up, wash, and set aside for coating.

414.—To Modify a Landscape Negative.

Prepare the following solution:—

Water	...	...	...	...	100 parts
Dextrine	...	...	...	...	4 "
Sugar	...	...	...	...	5 "
Bichromate of potash	...	...	...	...	3 "

and a few drops of ammonia, until the odour is perceptible in the liquid. This mixture is used to cover the back of the negative. Drain and dry the plate horizontally, at a temperature of 140° F. While still warm place it in the printing-frame, the image against the glass; expose to daylight until the coating has become insoluble in the shaded portions. A photometer may be used. The plate is again heated to 140° F., and in artificial light. Then apply with a soft brush very finely powdered graphite, which adheres only to those portions which have not been acted upon by the light. When the retouching is sufficient, expose the whole to collodion in a strong light, and wash until the yellow tint disappears.

415.—To Clean Marble, Jasper, Porphyry, &c.

Mix up a quantity of the strongest soap-lees with quick-lime to the consistence of milk, and lay it on the stone for twenty-four hours; clean it afterwards. This may be improved by rubbing afterwards with fine putty powder and olive oil.

416.—Cleaning Alabaster.

Strong soap and water is good for this purpose; if too much discoloured, make a paste with quicklime and water, cover the article well with it, and let it remain all day; wash off with soap and water, rubbing hard the stains. Or supply dilute muriatic acid, having previously washed off dirt and grease.

417.—To Clean Pictures.

Wash with a sponge or a soft leather and water, and dry by rubbing with a silk handkerchief. When the picture is very dirty, take it out of its frame, procure a clean towel, and, making it quite wet, lay it on the face of the picture, sprinkling it from time to time with clear, soft water. Let it remain wet for two or three days. Take the cloth off and renew it with a fresh one. After wiping the picture with a clean, wet sponge, repeat the

process till all the dirt is soaked out; then wash it well with a soft sponge, and let it quite dry; rub it with some clear nut or linseed oil. Spirits of wine and turpentine may be used to dissolve the hard, old varnish, but they will attack the paint as well as the varnish if the further action of the spirits is not stopped at the proper time by using water freely.

418.—Cleaning the Hands.

Put $\frac{1}{4}$ lb. glauher salts, $\frac{1}{4}$ lb. chloride of lime, and 4 ozs. of water into a small wide-mouth bottle, and when required for use pour some of the thick sediment into a saucer, and rub it well over the hands with pumice-stone or a nail brush. Stains of nitrate of silver may be removed from the hands by means of a solution of chloride of iron.

419.—Boring Holes in Glass.

Take a piece of soft copper wire the size you wish the hole, drill in the end $\frac{1}{8}$ inch more or less, according to the size of wire, leaving a shell of copper; then slightly file four small notches in the edge of the shell. Centre this bit of wire in a small foot lathe, which can be speeded quite high, fill the cavity in the wire with flour of emery and oil; with a cork press the glass lightly against the rapidly revolving copper drill.

420.—Grinding Focussing Screens.

First obtain a small packet of Wellington knife polish. Next, take two jugs—glass preferably—into one of which drop a spoonful of the polishing powder, fill with water, and stir well. Leave it for a few seconds, then pour off the somewhat turbid water carefully into jug No. 2, and let remain till quite clear; pour back the water into No. 1, and repeat the process till a sufficiency is procured. The contents of No. 1 may now be thrown away, and if the deposit of No. 2 be again washed in the same way, there will then remain a very fine powder, which may be safely used without risk of scratches. This can be dried and kept till required. Now for the grinding. On a flat table lay an old newspaper; on this place the glass to be ground, in the centre of which drop a small pile of the washed emery, and moisten with a dilute solution of sulphuric acid, say one drachm to the ounce of water; then, in the right hand, take the small piece of plate-glass, and with a circular motion work over the surface to be ground, continuing till a satisfactory result is attained. Add acid, water, and emery as required. The powder which works over the edges can be scraped and used over again till the process is finished. An occasional rinse under the tap will show progress.

421.—Registering Screens.

First.—Get a straight-edge any suitable length and three-quarters of an inch square, and a short wedge made of some kind of hard wood (boxwood, for example) which will retain its angles sharp. An oblique cutting, one and a half inches long, cut off the end of the square ruler, will serve for the wedge. Secondly.—Take the focussing-screen out of the camera, lay it on its back on the table, place the square ruler across its front, insert the wedge (without pressure) between it and the ground glass, then, with a sharp lead pencil, draw a line across the upper side of the wedge close to the edge of the ruler. Thirdly.—Put a plate in the slide, lay it on its back, and pull the shutter open; then, in the same manner, place the ruler across its front, insert the wedge (without pressure) between the ruler and the plate, and test it, first on the centre, then at the four corners. If the registration of the plate-carrier and the focussing-screen do not agree, the pencil line on the upper side of the wedge will either stop short of the edge of the ruler or pass under it when the wedge is inserted between it and the plate. A few lines, one millimetre apart, drawn on the sides of the wedge, parallel with its base or side, always placed in contact with the glass, will show how much the plate-carrier is out of focus. Plate-carriers with silver wire corners can be adjusted in a few moments, by simply bending the wires in or out, according as the pencil line on the upper side of the wedge indicates.

422.—To Preserve a Scaling or Cracked Painting.

Prepare a mixture of equal parts of linseed oil and methylated chloroform, which pour over the painting if the colours are too brittle to bear the friction of a soft brush. After remaining on the surface of the painting for a day or two, the excess of oil may be removed by means of a piece of cotton-wool or a soft brush, a fresh portion of the preservative applied, and the excess removed as before. The process must be repeated from time to time until the colours are firmly fixed, when the painting will bear friction, and may be submitted to the cleaning process, or varnished. It is advisable, however, to remove as much of the dirt as possible from the picture by careful washing with soft water previously to the application of the fixing agent. The mixture simply fixes the colours, and renders the painting very elastic. A mixture of one part of methylated chloroform and two of linseed oil is used for reviving the colours of paintings. A small portion is rubbed over the pictures, after washing, with cotton-wool, and on the following day the painting is wiped over with a soft silk handkerchief. Oil and chloroform, when used in the proportion given,

possess the property of restoring the faded colours of paintings, and develop colours which have perished, to the eye, by age.

423.—Bending Glass Tubes.

If a sudden bend is wanted, heat only a small portion of the tube to a dull red-heat, and bend it with the hand held at the opposite ends. If the bend is to be gradual, heat an inch or two of it in length, previous to bending it. If a gradual bend on the one side, and a sharp one on the other, as in retorts, a little management of the tube in the flame, moving it to the right and left alternately at the same time that it is turned round, will easily form it of that shape. In bending glass, the part which is to be concave is to be the part most heated. An ordinary gas flame is quite sufficient to bend glass by, but that of a spirit lamp is better.

424.—Glass, To Powder.

Make a piece of glass red hot in the fire, and while in this state plunge it into cold water; it will immediately break into powder; this must be sifted and dried. It is then fit for making glass paper, for filtering varnishes, and for other purposes.

425.—Printing from Cracked Negative.

If a negative (the glass only, not the film) be cracked, put it in a frame with a piece of plain glass first, and paste on the outside a piece of tissue or tracing paper, and whilst printing turn the frame round occasionally.

426.—Substitute for Stops.

If you lose your stops, cut substitutes out of a ferrotype plate; they will answer equally as well as the lost ones.

427.—Adapting Camera for Stereoscopic Work.

Attach to the inside of the front of the camera a partition of black opaque cloth, folded like the side of the bellows; this should reach close up to the back of the camera. It may also be made detachable, so as to allow of the camera being used for half-plate. If two lenses are to be used, a new front to camera, with apertures for the lenses, should be fitted, the distance between the centre of the apertures being of course $3\frac{1}{4}$ in. Or one lens only may be used by having a shifting front, with stop-catch at each side, to prevent the lens being moved further than $3\frac{1}{4}$ inches.

428.—Mount Cutting and Gilding.

Use the transfer gold leaf, which is gold leaf pressed on to waxed paper as a temporary support. This may be cut into strips, and upon applying the gold to the portion of the mount previously sized, it leaves the paper.

429.—Another

Way of applying gold paper to the bevel is first to paint the bevel and the mount as far as the gilding is required with gold size, using a small sable or camel-hair brush. Allow the size to dry until it is what is called "tacky," and then apply the paper (cut to a suitable width), or, better still, gold leaf. A very easy method is to paint with Judson's gold paint mixed rather thick.

430.—Cleaning Daguerreotypes.

Carefully remove the Daguerreotype from its frame, and separate from its covering glass, and place face upwards in a dish of clean water. Be extremely careful not to touch the front of the plate. Lift the plate by the corners, and remove the paper from the back when sufficiently soaked; rinse the plate thoroughly, and should the water be repelled as though greasy, flow over a little methylated spirit; if the tarnish on the edges is blue in colour, immersion in an ordinary fixing bath of hypo will remove it, but if any bronzing is visible, make a solution of cyanide of potassium, five grains to the ounce, and keep pouring this on and off till all tarnish is removed. Wash the plate thoroughly, and rinse thoroughly with distilled water; then take hold of one corner of the plate with a pair of pliers, and dry evenly from a top corner downwards over a spirit lamp or Bunsen burner. If any stain or deposit is left by unequal drying, the plate must be rinsed again with distilled water, and dried again.

431.—Gilding Mounts.

It is advisable to gild several mounts at once, by placing them in a press; or they may be done singly by applying with a brush a mixture of four parts of Armenian bole, one part of sugar-candy ground up with whites of eggs, to make sufficiently fluid; the gold leaf is then laid on, and, when dry, burnished. This gives a good red gold, but the whole, or part, of the bole may be omitted if desired. Small mounts may be gilded by applying thinned gold size with camel-hair brush, and then applying gold leaf; or gold powder may be mixed with the size, and then applied.

432.—Gilding Mounts by Binding.

To bind the bevel of mount with gold paper, take a sheet of gold paper and cover the back of it with thin French glue, being careful no dust or grit is in it, and hang up the sheet to dry. When dry, with the straight-edge cut the sheet up into strips about the eighth of an inch broad. Next pass over the tongue four strips, or enough of the gold paper for the mount, when the contact of the glue with the tongue will have moistened it, and it will be sticky and pliable. Now take the mount and lay it

down on the board before you, and with a strip of gold in the left hand, commence at the right-hand corner of the mount, and lay the strip close up, letting the edge of it be just covering the turn of the bevel; when about an inch is laid by the left hand, a clean duster once round the first finger of the right hand passed over the short piece laid in its place will secure it, and in like manner till you get to the end of the bevel, when a small pair of scissors is used to cut the strip to exactly fit the corner. It will now be found that one half of the gold strip is secured to the mount, and the other half is sticking to the board; carefully disengage the paper from the board by raising the mount, and pass the tongue quickly over the glue again, and with the finger of the right hand, as before, rub it down carefully over the right edge of the mount, and rub it down at the back. The other three sides must then be covered in the same way.

433.—Simple Enlarging Method.

A simple way to enlarge from an ordinary negative is to block out the light from the window by brown paper or a curtain, or other means, leaving sufficient space only to admit the back of the camera. Support this on a shelf, or in some other way. Place the negative in the dark slide. Draw both slides, and then focus with the lens upon a screen supported on an easel or table, until got to the size required, and sharp. Then cap the lens. Pin a piece of bromide paper on the face of the screen, and expose.

434.—Copying Daguerreotype.

To copy a Daguerreotype, place it inside a deep box lined with velvet or black cloth, with a hole in the lid for the lens to peep through, and a piece cut out of one side only to illuminate the plate by—sunshine is best. In most Daguerreotypes the marks of the buffer are seen as fine horizontal lines. In copying, these should be placed vertical, and, when in position, are not much seen.

435.—Another Method.

First remove the plate carefully from the mount, and dust lightly with a camel-hair brush. Make a solution of pure potassium cyanide, fifteen grains to the ounce of distilled water, and pour it into a porcelain dish. Wash the plate over, by pouring from a measure, with alcohol (absolute and pure) two or three times, and then plunge into the cyanide; rock, and the plate will in five to ten minutes become quite bright. Wash with water, giving a final rinse with distilled water, and then dry it by holding it over a spirit lamp with a pair of pincers, and blowing continuously until quite dry. Care must be taken not to touch the surface, except with the brush. To copy the

Daguerreotype, place it in a good light (sunlight if possible), and so that the light may fall in the directions of the "buff" marks across the plate. Place the camera as for copying a carte-de-visite, using R. R. lens, medium stop, and slow landscape plate, or, better still, new rapid chloride plate. To avoid reflection in front, a piece of cardboard, a foot square, covered with velvet, and with an opening just showing the glass of the lens, will be found quite effective. To remount the Daguerreotype, clean the glass carefully, and bind thin gummed paper round both glass and Daguerreotype, to prevent air getting in between the plate and the glass, or it will soon tarnish again.

436.—Photo-Lithography

Will never give fine results if the negative is not what it ought to be—clear in the lines, opaque in the ground. It is possible to develop a good negative on a slow gelatine dry plate, but nearly all the large establishments for photo-engraving and photo-lithography still stick to the old collodion process. The collodion must not be too thin, and have a sufficient quantity of iodide and bromide. The strontium iodide is perhaps the best to use. The nitrate bath should contain fifty grains of nitrate of silver to the ounce, and about a grain or two of iodine. Iodine is the best thing to make the nitrate bath acid. The ordinary iron developer—

Water	...	...	...	...	1 ounce
Sulphate of iron	...	...	...	...	24 grains
Acetic acid	...	...	...	...	24 "
Alcohol	...	...	...	...	24 "

is good. The exposure of the plate must be rather short. For fixing, use hypo. The well-washed negative is whitened in a solution of 24 grains bichloride of mercury in 1 ounce of distilled water; this acts quicker in a strong daylight than in the dark. Wash well, and dip into a bath of 10 parts of water and 1 part of ammonia. As soon as the negative has become dark, wash it again, and coat it with gum water; let dry, and varnish as usual. Another way is to intensify the developed negative in the usual way with pyro and silver, fix it, and after washing treat it alternately with solutions of bichromate of potash and of hypermanganate of potash, until it has become of a strong orange-yellow colour. Wash and dry. Tint the ordinary negative varnish with alcoholic solution of aniline blue. This varnish makes the ground of the negative in transparency deep black, while the lines appear blue.

437.—Carbon Solar Prints.

Gelatine, refined lampblack, bichromate of potassium, and

water, are mixed in suitable proportions. The vessel containing these ingredients is placed in a water bath, which is heated until complete admixture and the requisite degree of fluidity are reached. It is then applied to the drawing-paper upon which the picture is to be finished in the form of fine spray, by means of an air-blast from a cylinder charged with compressed air. The coating thus applied is granular in form, which permits the light to penetrate it to such an extent that the middle tints are saved from being washed away in the development. The pigment dries quickly, when it is ready to be exposed to the image of the solar camera, and the requisite exposure is only about one-tenth to one-fifth of the length of that required for silvered paper. The picture is developed by washing off the unimpressed or soluble pigment with hot water. For this purpose the print is wetted, and placed in an upright position on a stretcher covered with muslin; the water, under considerable pressure, is showered upon it through a rose connected by a short hose to a double faucet supplying it both with hot and cold. The temperature and pressure are easily regulated by increasing or lessening the flow of either or both at will. Finally, the print is washed to remove the little remaining chromium salt from the paper, which being done, it is ready for mounting. The surface of the print is entirely without gloss, and the "tooth" of the paper is improved by the stippled effect consequent upon the method of applying the pigment. When required for water-colour work, a neutral grey is used instead of lampblack alone.

438.—Half-Tone.

A proof is required from a machine-ruled plate, from which are to be made negatives absolutely sharp and clear, these negatives being called screens. One of these screens being selected, it is placed in front of the sensitive plate in the dark slide, the photograph it is desired to reproduce being exposed through the screen, the result being a grained negative. From the grained negative thus obtained a print is made upon zinc, dried, coated with gum, and rolled up with the india-rubber roller. It is then etched for one minute in an acid bath containing 1 part acid to 100 parts water; then washed, gummed, dried, and rolled up again, and etched for five minutes. Then the process is repeated three or four times more, when the resist may be cleared off, and the block is ready for trimming and mounting type high.

439.—Dead-Black Varnish.

Take two grains of lampblack, put it into any smooth, shallow dish, such as a saucer or small butter-plate, add a little gold size, and thoroughly mix the two together. Just enough gold size

should be used as will hold the lampblack together : about three drops, of such size as may be had by dipping the point of a lead pencil about half an inch into the gold size, will be found right for the above quantity of lampblack ; it should be added a drop at a time, however. After the lampblack and size are thoroughly mixed and worked, add twenty-four drops of turpentine, and again mix and work. It is then ready for use. Apply it thin with a camel-hair brush.

440.—Removing Glass Stoppers.

When a stopper is found to be immovable, it may often be loosened by gripping the neck of the bottle firmly in the left hand, applying the thumb at the same time with a firm upward pressure against one side of the head of the stopper, and smartly tapping the opposite side with the handle of a spatula or other suitable piece of wood. The force should be applied in the direction of the longer axis. The operation may often be expedited by placing a drop of oil or other liquid—according to the nature of the contents of the bottle—on the line at the junction of the stopper and the neck of the bottle ; when the stopper is tapped a minute space is momentarily formed, into which the liquid slips, and so gradually gets between the stopper and the neck of the bottle, and allows of the former being easily withdrawn.

441.—Another Method.

Another method is to use a stopper extractor. This can easily be made out of a block of wood three inches square and two inches thick, by cutting a hole through its centre large enough to receive the head of a stopper of a forty-ounce wide-mouthed shop round. To apply the extractor, it is placed over the stopper and grasped firmly in one hand, while the neck of the bottle is held by the other. A gentle but firm and steady twisting motion is then used, care being taken to keep both hands moving in the same plane, but in opposite directions. If the pressure be applied too vigorously or spasmodically, or if the lines of the direction of the opposite forces be not quite parallel, there is a danger of wrenching off the head of the stopper, or breaking the neck of the bottle.

442.—Another Method.

If either or both of these methods fail, the application of heat may be tried. This may either be induced by friction, by means of a string passed once round the neck of the bottle and drawn rapidly backward and forward, the bottle being held fast meanwhile ; or it may be applied by dipping the corner of a towel in hot water, squeezing, and wrapping it round the neck of the

bottle, and repeating this at short intervals. When the glass has sufficiently expanded, the stopper should be immediately removed, and not be inserted till the bottle has cooled.

443.—To Measure the Angle of View included on a Plate.

Having spread on a table a large sheet of paper, draw on it a straight line equal to the length of the plate that is to be used, eight inches for an 8 by 5 plate, ten inches for a 10 by 8 plate, and so forth. Now, from the centre of this line erect a vertical line a little longer than the focus of the longest of the series of lenses that are to be subjected to this examination. With a foot-rule measure off from the base line the focus of the lens, and put a mark on the vertical line, and then with a pencil draw lines from this mark to each end of the base line first made. If there are more lenses than one to be thus determined, then let this measurement on the central line, followed by the extension lines to the ends of the base line, be made in every case, and each angle thus made by the pencil will represent the angle of view included on the plate by that particular lens which was instrumental in having such angular markings effected. To *measure* the angles thus obtained, place a protractor so that its centre or zero coincides with that mark on the vertical line upon the sheet of paper, and note where the diverging pencil lines touch the scale on either side, and enter the figures in the note-book as the angular covering power of that lens on that size of plate.

444.—Indexing Pattern Photographs.

Spread a white paper on the floor, lay patterns on it in proper order, place on each pattern a small square of white paper, on which is printed a black, plain figure, beginning with one, two, three, &c.; these may be cut from an old calendar, or painted purposely. Directly over the patterns suspend by any suitable means a photographic camera, and you have it. From the negative thus obtained make two blue prints.

445.—Photographic Lamp Shades.

Take a sheet of ferro-prussiate paper and cut it up into pieces of pyramid shape; then place the paper under a negative (quarter-plate) in the printing frame; if this be done carefully the paper need not be creased much, and the subsequent washing will remove what creases are made. When printed pretty deeply, remove paper, and, placing some circular object—say a jam pot—over the centre, leave it exposed to the light until the uncovered portion of the picture is effaced; then fix the print by washing in the usual way, and having joined the necessary number of pieces—say six—together by gumming them to strips of tape, the shade is complete.

446.—A Makeshift Changing Bag.

Take off your coat, button it up, place inside the box of plates and dark slide, close two holes in bag by squeezing them tight between two legs of the camera. Then lay your makeshift on the ground, buttons downwards, put your arms down the sleeves from the outside, and change your plates.

447.—Lunar Photography.

Remove the eyepiece of the telescope and the lens of the camera, and insert the tube of the telescope inside the camera, covering any aperture in front of the camera with dark cloth; then focus in the usual way, and, having inserted the dark slide, expose. Use a rapid plate, preferably $\frac{1}{4}$ -plate, or $3\frac{1}{4}$ square, and give an exposure of about one-fourth second. It would be preferable to use a photo-micrographic camera, as being very much lighter and easier to adapt by sliding tube inside or outside that of the telescope. Photographs of the moon may be taken by the aid of a telescope, but it will not be necessary to use a lens at all. The telescope may be mounted on any tripod, and the eyepiece must be removed. The camera should be racked up as close as possible, the front being fitted with a brass tube in place of lens, and fitting into the body of the telescope in the same manner as the removed eyepiece. Close to the camera a Newman's shutter should be placed, with a slot made in the brass tubing to take the place of the diaphragm slot in the lens. Focus as usual, and use an "extra" rapid plate. An exposure of a fraction of a second is all that is necessary to secure full detail. The exposure is important, as this instantly enables one to dispense with the clock and other arrangements, and to use any telescope.

448.—Residues.

Take a piece of tin 26 by 20, and bend in the form of a chimney, 20 inches high, and 6 inches square, 2 inches being allowed for the overlap. About 4 inches from the bottom wedge in a piece of perforated zinc to form a grate, and place a similar piece on the top to prevent the tinder from being carried away by the draught. Two corners of the chimney are slit up as far from the bottom as the grate, and the piece thus semi-detached bent out to produce a current of air.

449.—A Summer Drink.

Three W. M. bottles, or small tin canisters, are kept in a handy place, containing respectively castor sugar, carbonate of soda, and tartaric acid. When a drink is required, dissolve in a tumbler of water about 20 grains of sugar and 10 grains soda; then add about twelve grains of the acid, stir well, and drink

while effervescing. The ingredients can be weighed out and put up in packets ready for use if desired, and can then be carried in the pocket and used at any time. If the juice of a lemon be used in place of the acid, the drink is rendered still more refreshing.

450.—Copying Tracings.

Make a solution of gelatine, 1 part; water, 15 parts; warm it till dissolved, then well mix with it Indian ink or any pigment desired. Pour it while warm and fluid into a dish, and float paper upon it, and let it dry spontaneously without heat, and away from dust. When dry, immerse it in the following solution:—

Perchloride of iron	...	...	...	240 grains
Tartaric acid	...	...	...	72 „
Water	...	...	...	5 ounces

Let it remain two or three minutes, and dry it in the dark. Print under the tracing in the usual way. Develop by immersing it in warm water. The light causes the part not protected by the lines to become soluble in warm water. The lines are thus rendered black or coloured on a white ground.

451.—Stripping a Negative from a Cracked Glass where the Film is not Broken.

Support the negative upon another glass and level them upon the levelling stand; coat with ordinary transfer collodion, using enough to just cover the negative. When the collodion is thoroughly well set (about ten minutes), place in water at about 60° till all greasiness has disappeared. Change the water and add a few drops of hydrofluoric acid, and watch while gently rocking the dish. In about a minute the film will begin to rise at the corners; when this occurs, lift the negative out at once, and well wash under a rose. Now take a plate prepared with hard gelatine and dried—larger than the negative to be stripped—lay the plate at the bottom of a dish of clean water, float the negative off, and lift it out upon the prepared plate; drain, and dry spontaneously. When dry, the collodion may be removed with its solvents, assisted by cotton-wool.

452.—Retouching on the Film.

Dissolve one ounce of Venetian turpentine in a cup (same way as you would dissolve glue); when quite melted, add gradually one ounce of finely-powdered resin, stirring all the while. Then place on the fire, and just keep it at the boiling point for half an hour. Now add spirits of turpentine until thin enough, and filter. It may be used either under or over the varnish, and any varnish may be used.

453.—Removing Rust from a Lens.

By applying a paste composed of putty powder and water to the stains, and then rubbing briskly with either the point of the finger or the side of the hand, every spot of rust or stain will be removed in a few minutes. This applies to photographic or other lenses, except the object glass of a telescope, which would be irreparably damaged by such treatment.

454.—To Make a Thermometer.

Take a fine glass tube blown into a bulb at one end. The bulb is heated, the air expands ; it is then placed under mercury, which rushes in as the tube cools, and takes the place of the air which was driven out by the heat. It is then managed so that the mercury should be at a convenient spot at the common temperature. Apply heat to the mercury until the column rises quite to the top of the tube ; then seal it by applying heat ; the mercury on cooling leaves a vacuum, which is essential to the perfection of the instrument. The great point is to graduate it. The freezing-point of water or the melting-point of ice is always constant ; the boiling-point of water is also constant. The barometric pressure being constant, distilled water is made to boil, and the thermometer surrounded with the steam produced ; the point to which the mercury rises is marked off with a file, and the freezing-point of water is also marked. It only remains to divide the interval into degrees, which is arbitrary.

455.—Paper Transparencies.

The paper, instead of being floated upon the silver bath, should be immersed in it ; and this, coupled with carrying the printing farther than usual, will ensure such a reduction of silver in the paper as will give a transparency possessing quite as much intensity as will be necessary. After the print is toned (if necessary), fixed, and washed, it should be rendered translucent by coating it with a suitable varnish, such as a solution of Canada balsam in turpentine.

456.—Impervious Coating for Wooden Dishes.

This may be made from equal parts of Swedish pitch and vulcanised rubber, with one-fourth part resin, boiled up together in an old saucepan. The mixture being very inflammable, it is as well that it should be made out of doors, with the lid of the saucepan handy in case it should catch fire. If not quite liquid enough, add a little more pitch. When melted, stir and apply with a paint brush quickly, having previously well dried the dish before applying the solution, being particular to well work it into the joints.

457.—To Blacken the Brass-Work of Lenses.

The diaphragms of lenses ought not to be blackened by the dead black varnish which is employed on the cells and the inside of the tube, as it would invariably chip off and produce a worse effect than if left untouched. They ought to be stained, by being first made quite clean, and then receiving an application of a solution of nitrate of silver and nitrate of copper, heat being then applied.

458.—Freckles.

They may be mitigated in a considerable degree by bathing the face in very warm water immediately before sitting. A still more successful way to prevent their appearance on the negative is to get the sitter to apply puff powder of a yellow colour to the face. Common violet powder will answer if with it be mixed any harmless yellow powder.

459.—Mounting Stereographs.

No pictures should ever be mounted so as to exceed three inches apart, but, if possible, a quarter of an inch less should invariably be preferred; and no picture should have so much subject shown on the left-hand margin of the left-hand picture as displayed on the left hand of the picture on the right, and *vice versa* with respect to the right hand. That on the right-hand side of the mount should show less subject, laterally, than on the left side picture.

460.—To Bleach Sponge.

Soak it well in dilute muriatic acid for twelve hours. Wash well with water, to remove the lime, then immerse it in a solution of hyposulphate of soda, to which dilute muriatic acid has been added a moment before. After it is bleached sufficiently, remove it, wash again, and dry it.

461.—To Whiten Lace.

Lace may be restored to its original whiteness by first ironing it slightly, then folding it and sewing it into a clean linen bag, which is placed for twenty-four hours in pure olive oil. Afterwards the bag is to be boiled in a solution of soap and water for fifteen minutes, then well rinsed in lukewarm water, and finally dipped into water containing a slight proportion of starch. The lace is then to be taken from the bag and stretched on pins to dry.

462.—Cleaning Daguerreotypes.

First remove carefully the plate from the mount, and pass a camel's-hair brush lightly over the surface; then immerse the

plate in a solution of pure cyanide of potassium of about ten grains to the ounce of water, but before doing so pour some alcohol three or four times over it from a measure, and then plunge it in the cyanide and let it remain till all the tarnish has disappeared, after which wash in clean water and dry.

463.—Dry Pocket Glue.

Dry pocket glue is made from twelve parts of glue and five parts of sugar. The glue is boiled until entirely dissolved, the sugar dissolved in the hot glue, and the mass evaporated until it hardens on cooling. The hard substance dissolves rapidly in lukewarm water, and is an excellent glue for use on paper.

464.—Cracked Negative, To Print a.

Keep the frame slowly rotating either by hand or by some simple mechanical arrangement (such as a smoke-jack or old clock-spring) during the printing, and no trace of the crack should show.

465.—Cracks in Slides.

Make a cement of glue, fine sawdust, and whitening. Mix well together to make a thick paste, and apply with a knife-blade.

466.—Colouring Enlargements.

Make an enlargement on bromide paper, and work it up with crayons. This process is mostly worked in black or sepia; but if you want to use coloured crayons, then you must develop the image faintly on the paper, so that the black tone may not spoil the colouring, or the result of your labours will be disappointment. An enlargement may be made on Eastman's A paper, developed well out, then soaked in castor oil until quite transparent, and coloured from behind as in crystoleum. Use oil colours.

467.—Indelible Pencil Writing.

Lay the writing in a shallow dish, and pour skimmed milk upon it. Any spots not wet at first may have the milk placed upon them lightly with a feather. When the paper is wet all over with the milk, take it up and let the milk drain off, and remove with the feather the drops which collect on the lower edge. Dry carefully.

468.—Pencil Drawings, To Fix.

Prepare water-starch, in the manner of the laundress, of such a strength as to form a jelly when cold, and then apply with a broad camel-hair brush, as in varnishing. The same may be done with thin, cold, isinglass water, or size, or rice water.

469.—Mounting Engravings.

Strain thin calico on a frame, then carefully paste on the engraving so as to be free from creases; afterwards, when dry, give two coats of thin size (a piece the size of a small nut in a small cupful of hot water will be strong enough); finally, when dry, varnish with white, hard varnish.

470.—Removing Silver Stains from Linen.

Stains should always be removed from linen before it is sent to be washed. Wet the part stained, and put on a few drops of a saturated solution of cyanide, or rub it with a solid lump; if the mark does not quickly disappear, wash, and put on a drop or two of the iodine solution mentioned in the preceding paragraph; the stain will change colour, and a little cyanide will dissolve it. When the linen is double, and the stain goes through, the solutions must be applied to each side.

471.—Photographing Silver Goods.

Focus as usual, and then have a wooden cap for lens, with a piece of yellow glass in it, and take photo through the yellow glass. The exposure is increased about four or five times.

472.—Another Method.

You could either work out of doors or else in an ordinary room, screening all direct light from them by the aid of tissue paper or muslin, and by using a long-focus lens, much, if not all, reflections would be lost.

473.—Another.

Place articles on a table covered with a black tablecloth, also have a black background; photograph in the open, and have a side-light to give relief and roundness.

474.—Another.

Paint the plate over with thin gold size, and when nearly dry dust over by shaking from a muslin bag some magnesia which has been coloured a light grey neutral tint by a mixture of ivory black and ultramarine blue, just sufficient to tint it. When dry, brush off surplus powder with a very soft dry plate brush. The articles then prepared may be arranged on a table draped with a black or crimson cloth, placed out of doors with a screen behind, the medals suspended from the edge of the table.

475.—Frosting Stereoscopic Transparencies.

Dissolve thirty grains of wax in a fluid ounce of chloroform, and pour over the surface of the transparency. The solvent will evaporate almost immediately, but the full effect is only obtained after the plate has been allowed to stand for eight or ten hours.

476.—Cutting Pencils.

If the point is intended for sketching, it is cut equally from all sides, to produce a perfectly acute cone. If this be used for line drawing, the tip will be easily broken, or otherwise it soon wears thick; thus, it is much better for line drawing to have a thin, flat point. The general manner of proceeding is, first, to cut the pencil, from two sides only, with a long slope, so as to produce a kind of chisel-end, and afterwards to cut the other sides away only sufficient to be able to round the first edge a little. A point cut in the manner described may be kept in good order for some time by pointing the lead upon a small piece of fine sandstone or fine glass-paper.

477.—Removal of Ink Stains from Photographs.

Assuming it to be gallate of iron ink, dissolve a drachm of oxalic acid in an ounce of warm water, and, having wetted the surface of the print with warm water, apply the solution to the spot, and rub gently until it disappears. Keep it warm throughout. Wash thoroughly, and dry.

478.—Paint for Studio.

A capital paint for reflecting walls, studios, &c., which is both fire and waterproof, can be made by grinding with a muller on a marble slab kaolin and solution of silicate of soda or potash, and thinning it with water; it can be tinted if required with ochre, umber, or oxide of iron. The same mixture makes a good cement for glass dishes, and, smeared over corks and around stoppers, forms a lute which will effectually confine most volatile substances to their bottles.

479.—To Make Water Colours Flow on a Photograph.

The greasy surface of an albumenised print not unfrequently repels water colours when applied to them. While prepared ox-gall will ensure their smooth flowing, one of the simplest and best methods of treating the print is to apply the tongue to the surface. After this dries, the colours will "take" to the surface and flow evenly.

480.—Cleaning Bottles.

Gun-shot in water is good for cleaning bottles.

481.—Mounting Drawings or Paper on Linen.

The linen or calico is first stretched by tacking it slightly on a frame or board. It is then thoroughly coated with strong size, and left until nearly dry. The sheet of paper to be mounted requires to be well covered with paste; this will be best if done

twice, leaving the first coat about ten minutes to soak into the paper. After applying the second coat, place the paper on the linen and dab it all over with a clean cloth. Cut off when thoroughly dry.

482.—Transfer Paper

Is made by rubbing white paper with a composition consisting of 2 ounces of tallow, $\frac{1}{2}$ ounce powdered black lead, $\frac{1}{4}$ pint of linseed oil, and sufficient lamp-black to make it of the consistency of cream. These should be melted together and rubbed on the paper whilst hot. When dry it will be fit for use.

483.—Crystal Varnish.

Dissolve 1 ounce of white lac in 10 ounces of warm spirits of wine. Let the varnish settle for several weeks, then carefully decant the clear portion into a bottle for use.

484.—To Renew Manuscripts.

Take a hair pencil and wash the part that has been effaced with a solution of prussiate of potash in water, and the writing will again appear if the paper has not been destroyed.

485.—Varnish for Coloured Drawings.

Canada balsam, 1 ounce; spirits of turpentine, 2 ounces. Mix them together. Before this composition is applied, the drawing or print should be sized with a solution of isinglass in water, and when dry apply the varnish with a camel hair brush.

486.—To Intensify Negatives after they are Varnished.

When a negative has been varnished, it sometimes becomes so weakened as to cause great disappointment. But a negative need not be given up as hopeless under these circumstances. Make a negative intensifying varnish by adding tincture of iodine—alcohol, 1 ounce; iodine, 10 grains—to any good negative spirit varnish, until of a very deep sherry colour. Label the bottle, and keep for special use.

487.—Ox-Gall for Artistic or Scientific Purposes.

Procure from a butcher half a pint of ox-gall. Place this in a clean saucepan and add an ounce of powdered alum and an ounce of common salt. Place over the fire, and when it boils remove for half an hour to cool; then boil again, and repeat this boiling and cooling for three or four times. After this allow it to settle for three or four hours, and decant off into a bottle, in which put two or three drops of essence of lemon. Cork and preserve for use.

488.—Removal of Oil Stains.

Mix pipe-clay or fullers' earth with cold water to a paste, and apply some of it to the soiled spot, without friction, so as not to injure the design. After having remained there for about twelve hours, it is removed and the remains brushed off. The porous material, after the water has evaporated, soaks up at least a portion of the oil. If the stain does not disappear by one application, it is to be repeated.

489.—To Strengthen Alcohol.

Pour it into a clear glass bottle, and add a tablespoonful of finely-powdered and well-dried carbonate of potash. Now cork the bottle, and shake well up for a couple of minutes. Allow to settle, and in a few minutes the water which was mixed with the alcohol will be found at the bottom, united with a portion of the potash, the superfluous portion of which will also be precipitated, leaving the alcohol clear and strong.

490.—To Bleach Engravings.

Immerse the prints for one minute in Javelle water, and then wash thoroughly in water containing a little hyposulphite of soda. To prepare the Javelle water, take four pounds of bicarbonate of soda and one pound of chloride of lime; put the soda in a kettle over the fire, add one gallon of boiling water, let it boil from ten to fifteen minutes, then stir in the chloride of lime, avoiding lumps. When cold, the liquid can be kept in a jug or bottle ready for use.

491.—To Clean Slimy Sponges.

Dissolve one ounce of fused chloride of calcium in eight ounces of water. Wet the sponge, then submerge it in the solution until the slimy substance disappears, after which wash in plain water.

492.—Polishing Brass.

For polishing brass, rub the surface with rottenstone and sweet oil, then rub off with cotton flannel, and polish with soft leather. A solution of oxalic acid rubbed over tarnished brass soon renders the metal bright. Wash off the acid with water, and rub the brass with whiting and soft leather.

493.—Cleaning Dishes.

For cleaning dishes, measures, the backs of negatives, and, in fact, everything, Brooke's Monkey soap is invaluable. It is very easy to keep a cake handy, and rub the trays, &c., with a bit of sponge which has been drawn over the soap.

494.—To Clean Paint Brushes.

When a paint brush is stiff and hard through drying with paint on it, put some turpentine in a shallow dish, and set on fire. Let it burn for a minute until hot, then smother the flame, and work the pencil in the fingers, dipping it frequently into hot spirits. Rinse all paint brushes, pencils, &c., in turpentine, grease with a mixture of sweet oil and tallow, to prevent them from drying hard, and put them away in a close box.

495.—Artificial Ivory for Photographs.

Mix together sulphate of baryta with gelatine or albumen, compressing the product into sheets and drying it.

496.—A Brilliant Black Varnish

For iron, stone, or wood, can be made by thoroughly incorporating ivory black with common shellac varnish. The mixture should be laid on very thin. But ordinary coal-tar varnish will serve the same purpose in most cases quite as well.

497.—Improving Lamplight.

A piece of camphor placed in oil will increase the actinic effect of lamplight.

498.—Toning Dodge.

Prints tone better in warm water than in cold.

499.—Developing Uneven Negatives.

If, in developing a picture, the distance is bright and the foreground dark, tilt the developing dish so that the developer may be deeper over the foreground than over the distance.

500.—A Makeshift Cap.

If you lose a lens cap, cut a makeshift out of a piece of cork.

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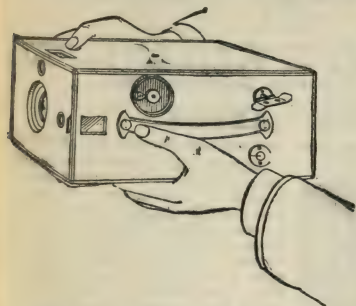
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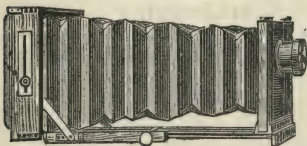
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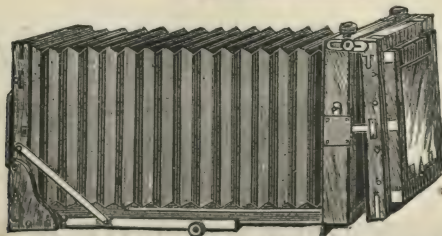
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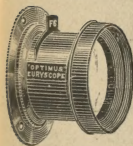
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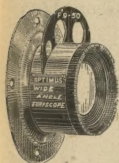
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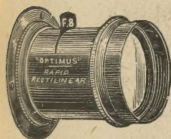
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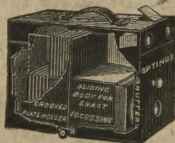
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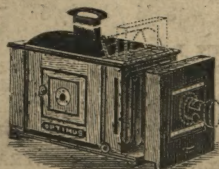
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6-in., no „	133	0
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7-in., no „	155	0
7-in., with „	173	6
8-in., „	256	0
9-in., „	290	0
10-in., „	360	0
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Russian Iron instead of
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5-in., no lens ..	75	0
5-in., and „	102	6
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6-in., and „	115	3
7-in., no „	110	0
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